EXHIBIT 13
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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS

State of Texas, *et al*.,	
Plaintiffs,	**Case No. 4:20-CV-957-SDJ**
v.	**Hon. Sean D. Jordan**
Google LLC,	
Defendant.	

Expert Report of Professor Steven N. Wiggins

July 30, 2024

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I.   Introduction

A. Qualifications

1.   My name is Steven N. Wiggins. I am a Professor of Economics Emeritus at Texas A&M University. I retired from Texas A&M University in May 2021 where I had taught since 1979. In my time at Texas A&M, I served in chaired professorships, including serving as the George and Mary Jordan Professor of Economics and Public Policy from 1993 to 1999, and serving as the Rex B. Grey Professor of Economics at the Private Enterprise Research Center at Texas A&M from 1986 to 1989. I also served as a Visiting Lecturer at the University of the Saarlands and the Johann Wolfgang Goethe University, both in Germany.

2.   I received my Ph.D. in Economics from MIT in 1979. My primary field in economics is Industrial Organization. In addition, I have areas of concentration in financial economics and econometrics—the latter being the branch of economics concerned with statistics and the measurement of economic data. My curriculum vitae appears as Appendix A to this report.

3.   Industrial Organization is the field of economics that involves competitive conditions in markets, antitrust, research and development, intellectual property, advertising and brand names, distribution, contracting, and the theory of the firm. As a field, Industrial Organization focuses on developing general economic models of firm behavior. Specifically, Industrial Organization economists develop theoretical and empirical methods designed to address issues regarding market power, competition, price and non-price strategies (such as advertising and promotion) to compete in markets, profitability, and the valuation of firms and property. The methods developed apply both generally and to particular industries.

4.   During my time at Texas A&M, I taught Ph.D. and undergraduate level classes in Industrial Organization and Economic Theory. These courses dealt with a wide variety of economic models, bargaining models, analytical methods, and industries. These courses also dealt specifically with antitrust, valuation, the economics of advertising and promotion, and intellectual property in addition to the broader topics discussed above. I also taught graduate and undergraduate courses in microeconomic theory.

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5.   I have authored or co-authored more than 35 scholarly articles on a variety of economic
         issues. These articles have been published in leading journals in economics and law,
         including the American Economic Review, the Journal of Political Economy, the Review
         of Economics and Statistics, the Journal of Legal Studies, and others. A list of these
         publications is included in my curriculum vitae, which can be found in Appendix A.

6.   I have undertaken a variety of academic studies including both theoretical and empirical
         work applied to numerous industries designed to address a wide range of issues. That
         work has addressed topics in contracting, the theory of the firm, bargaining, competition,
         pricing, intellectual property, regulation, research and development, and patents. I have
         directly applied the models developed in my studies to a wide variety of industries. I have
         also developed and published models that apply economy-wide.

7.   My academic research has been supported by the federal government, including grants
         through the National Science Foundation, the Office of Technology Assessment, and the
         Federal Trade Commission. It has also been supported by the governments of the State of
         Texas and the Federal Republic of Germany, as well as numerous private organizations
         and firms.

8.   I have lectured nationally and internationally regarding my research. These research
         presentations include seminars at prestigious public and private U.S. universities, such as
         Harvard, MIT, Yale, Chicago, Stanford, UCLA, Michigan, Wisconsin, and Northwestern,
         and including the law schools of Yale, Columbia, Chicago, and Stanford. I have also
         lectured at professional meetings in the United States and abroad. I have provided long-
         term lecture series twice in Germany and once in Italy, dealing with the economics of
         contracts and firms.

9.   I have also been asked to testify and have testified extensively in the United States,
         including in federal courts such as federal District Courts, the Court of Claims, and the
         Tax Court, as well as in state courts in Texas. My testimony has included a wide variety of
         analyses, including covering antitrust liability and damages related to monopolization,
         exclusionary conduct, group boycott, price-fixing, predatory pricing, and collusion. I have
         also testified regarding a broad range of economic damages including breach of contract
         and intellectual property. I have testified in matters involving a variety of industries. A list
         of the cases in which I have provided deposition or trial testimony in the last ten years is

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included in my curriculum vitae, which can be found in Appendix A.

B. Assignment

10.   I have been asked by counsel for Google LLC (hereafter, "Google") to analyze the civil penalties claimed by the plaintiff States for alleged violations of state deceptive trade practices acts (DTPAs), and to evaluate the opinions rendered by one of their expert witnesses, Mr. Jeffrey S. Andrien and certain opinions related to penalties offered by their expert witness Professor Weinberg. While my analyses assume, *arguendo*, that Google has been found to have committed the alleged violations, I am not expressing an opinion as to whether the evidence in the record would support such a conclusion.

11.   I am being compensated at my standard billing rate of $1,200 per hour. This compensation is not dependent in any way on the opinions I express or the outcome of this matter. My work in this case has been supported by Charles River Associates ("CRA"), a consulting firm of which I am a Senior Consultant. The CRA professionals that assisted me in this matter worked under my direction and supervision. In addition to my hourly compensation, I also receive compensation from CRA based on billings by CRA's staff in this matter.

12.   Appendix B to this report identifies the materials I have relied upon in forming my opinions. In reaching the opinions set forth in this report, I also relied on my general training in economics, and my teaching and research background and experience in Industrial Organization, economic theory, and antitrust economics.

13.   My review and evaluation of case facts and issues is ongoing. I reserve the right to supplement or modify my opinions based on additional discovery materials, expert reports, pleadings, and other material that becomes available.

C. Summary of Opinions

14.   Plaintiffs' expert, Mr. Jeffrey S. Andrien, opines that civil penalties for DTPA violations should "penalize[] Google for at least the benefits it gained associated with the alleged misconduct."[1] Purporting to apply that framework, Mr. Andrien concludes that it would be appropriate to impose DTPA civil penalties up to $21.81 billion on Google for alleged

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[1] Expert Report of Mr. Jeffrey Andrien, June 7, 2024 ("Andrien Report") at ¶ 106.

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deception[2] concerning Reserve Price Optimization, Dynamic Revenue Sharing, Project
Bernanke, Alchemist, and the Network Bidding Agreement with Facebook.[3] Mr. Andrien
calculates total DTPA civil penalties by multiplying (a) the number of transactions that he
assumes to have been affected by the alleged deception by (b) a per-violation penalty that
he deems appropriate.[4] This approach is flawed for numerous reasons.

15.   Mr. Andrien's approach fails to follow his own framework. Instead, Mr. Andrien, at the
        apparent request of plaintiffs' counsel, assumes that all transactions "within the assumed
        period associated with each misconduct" were "affected."[5] Mr. Andrien makes no attempt
        to link these allegedly "affected" transactions to any gains to Google from the alleged
        deception. Mr. Andrien also proposes an arbitrary and inflated per-violation penalty that is
        ungrounded in either economics or his own framework. Mr. Andrien's only explanation
        for his proposed per-violation penalty is "information available to me as of today" and
        "my education, training and experience."[6] See Section III.

16.   Mr. Andrien makes numerous errors in calculating the number of transactions that
        correspond to the alleged DTPA violations. He erroneously counts worldwide rather than
        U.S. transactions; includes in-app transactions that he claims to have excluded; fails to
        exclude transactions pertaining to states that cannot recover penalties for business-to-
        business transactions; fails to use the available data about customer locations when
        allocating transaction counts to the plaintiff States; includes transactions occurring in time
        periods after the relevant programs had been publicly disclosed; and fails to account for
        state statutes of limitations. In addition, Mr. Andrien includes transactions for which the
        alleged deception did not impact whether the transaction cleared on AdX, the clearing

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[2] Throughout this report, I use the term "deception" to refer to all Google conduct plaintiff States allege to be unfair,
false, deceptive, misleading, abusive, unconscionable, or otherwise in violation of any of the plaintiff States'
respective deceptive trade practices laws.

[3] See Andrien Report at ¶¶ 45, 52-53, 127-130, and Table 4.

[4] See Andrien Report at ¶¶ 127-130.

[5] Andrien Report at ¶ 98 ("I have assumed that Google's misconduct indirectly affected all Open Auctions within the
assumed period associated with each misconduct"); *id.* at ¶ 98 footnote 267 ("I have been asked to assume based on
Professor Weinberg's report that all auctions during the period in which RPO, DRSv1, DRSv2, and Bernanke
misconducts were active were affected by the claimed misconduct, whether they were directly targeted by the
misconduct or not.").

[6] Andrien Report at ¶ 128 ("Based on the information available to me as of today, the analysis presented in this
report, as well as my education, training, and experience, I conclude that it would be reasonable and appropriate for
the trier of fact to assess a penalty in the range of ▮▮▮▮▮▮▮▮▮▮ for each violation.").

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price, or the revenue share charged by Google. Correcting these basic errors reduces Mr. Andrien's transaction count by 98 percent.[7] See Section IV.

17.   Mr. Andrien's proposed per-violation penalties vastly overstate the incremental benefits to Google from the alleged deception. The lower and upper ranges of per-violation penalties proposed by Mr. Andrien are roughly ▮▮ and ▮ times Google's profit on affected transactions.[8] Mr. Andrien also fails to account for profits that Google would have earned regardless of any alleged deception. See Section V.

18.   Correcting all of the foregoing errors would reduce the upper end of Mr. Andrien's DTPA civil penalty estimate from $21.81 billion to $44.9 million.[9] Even that corrected figure remains inflated—likely substantially so—because it wrongly assumes that Google would have made zero profit on affected transactions absent the alleged deception. See Section VI.

19.   Mr. Andrien does not attempt to assess directly how much Google benefited from the alleged deception. I do so in Section VII, where I assume Google committed *all* of the violations described by Mr. Andrien. My analysis is grounded in the extensive evidence presented in Section II regarding how advertisers, publishers, and their intermediaries make decisions primarily by monitoring return metrics, performing tests, and learning and adapting, rather than by monitoring public announcements regarding optimization features. I conclude that none of the alleged deception in this case generated incremental profits for Google, and thus that the appropriate DTPA civil penalty based on Mr. Andrien's framework is zero. Nevertheless, I also perform an analysis adopting plaintiffs' experts' (incorrect) theories regarding advertiser and publisher behavior and estimate that applying Mr. Andrien's framework would result in $21.7 million in civil penalties rather than his vastly inflated amount.[10]

20.   Mr. Andrien's other opinions are just as flawed as his penalties calculations. Mr. Andrien asserts that Google benefited indirectly from the alleged deception, but such effects are implausible and unsubstantiated. Mr. Andrien also incorrectly asserts that Google's

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[7] See Table 1.

[8] See Table 2.

[9] See Table C3.

[10] See Table D5.

exceptional overall financial performance is a relevant factor for assessing penalties, notwithstanding the inconsistency with his own framework for assessing penalties and basic economic principles. Mr. Andrien further asserts that Google has a "history of violations" that justifies large penalties, but none of his examples involved allegations similar to the alleged deception asserted in this case. See Section VIII.

II.   Background

A. Overview of Display Advertising

21.   Display ads are defined as a "[v]isual digital advertising format which uses designs such as animation, images, text, and video to attract consumers' attention."[11] Web and app publishers monetize their online properties by selling display ad "inventory," which consists of blocks of space adjacent to other content on sites and apps that can be filled with display ads.[12]

22.   Some ads permit or encourage "clicks" or actions. When a user elects to click on an ad, he or she is directed to another website where the user can learn more, or take an action, such as purchasing a product or downloading content. This latter class of actions is often referred to as "conversions," which can take many forms.[13]

23.   In the early days of online display advertising in the 1990s, advertisers generally negotiated for ad placement directly with publishers in bulk.[14] As online advertising grew and evolved, ad tech firms developed tools that made it possible for publishers to sell advertising inventory impression-by-impression through auctions that occur when an

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[11] "Glossary," *eMarketer*, available at https://totalaccess.emarketer.com/thesaurus.aspx (last accessed July 29, 2024).

[12] "Inventory basics: What is inventory?," *Google*, available at https://support.google.com/admanager/answer/10064557 (last accessed July 25, 2024).

[13] "Conversion Tracking: Definition," *Google*, available at https://support.google.com/google-ads/answer/6308 (last accessed July 25, 2024).

[14] "The History of Digital Advertising Technology," *Clearcode*, available at https://adtechbook.clearcode.cc/history-advertising-technology/ (last accessed July 25, 2024) ("It was during the early 1990s when many companies, organizations, and Internet enthusiasts started creating the first public websites. Advertisers soon spotted the potential that this new world had to offer and began testing uncharted waters. The year 1994 saw the first recorded example of online display advertising in the form of a banner ad, which appeared on a website called HotWired (now wired.com)…. In the early days of online display advertising, the exchange between an advertiser and a publisher was a direct sales process and resembled the way media had always been bought and sold.").

advertising opportunity arises as a user visits a website or uses an app.[15] An *impression*
occurs when a user is shown a display ad, irrespective of whether the user elects to "click
through" to the advertiser's content, online store, or other online resource.[16]

24.   The process of placing an online display ad in front of a user occurs faster than the blink
of an eye.[17] A primary purpose of these rapid transactions is to enable the placement of
ads that target consumers precisely based on their interests and characteristics. More
specifically, the goal of such targeting is to match particular ads to users whose "specific
traits, interests, and preferences" are more likely to result in outcomes sought by the
advertiser.[18] This targeting creates value by enabling advertisers to reach a more specific
audience than is possible with more traditional methods such as newspapers and
television. The ability to reach specific audiences also benefits publishers by increasing
the value of their ad inventory.[19] And users benefit by viewing ads more aligned with their
interests.[20]

25.   Ad tech platforms accomplish targeting by facilitating the "matching" of publishers (who
seek to monetize the ad inventory on their websites and apps) and advertisers (who
purchase ad inventory to reach their target audiences).

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[15] "The History of Digital Advertising Technology," *Clearcode*, available at https://adtechbook.clearcode.cc/history-advertising-technology/ (last accessed July 25, 2024); "Real-time bidding (RTB)," *ClearCode*, available at https://clearcode.cc/glossary/real-time-bidding-rtb/ (last accessed July 25, 2024).

[16] Sharma, Deepak, "The Ultimate Guide to Ad Impressions: Maximizing Your Impact," *AdPushUp*, March 31, 2024, available at https://www.adpushup.com/blog/ad-impressions/ (last accessed July 25, 2024) ("An ad impression is a fundamental metric in online advertising. It occurs when an advertisement is successfully displayed to a user on a website, mobile app, or any digital platform. It signifies that the ad has been visually presented, regardless of whether the user interacts with it or not.").

[17] See Zawadziński, Maciej and Mike Sweeney, "How Does Real-Time Bidding (RTB) Work?," *Clearcode*, April 16, 2024, available at https://clearcode.cc/blog/real-time-bidding/ (last accessed July 25, 2024) ("One of the most remarkable facts about RTB is the speed of the auctions in the ad exchanges – each transaction takes about 100 milliseconds (a 10th of a second). To put that into perspective, it takes about 300 milliseconds to blink." (internal emphasis omitted)).

[18] "What is Targeted Advertising?," *GCF Global*, available at https://edu.gcfglobal.org/en/thenow/what-is-targeted-advertising/1/ (last accessed July 25, 2024).

[19] Wu, Susan, "How Publishers And Advertisers Can Activate Sell-Side Targeting," *PubMatic*, February 8, 2023, available at https://pubmatic.com/blog/how-publishers-and-advertisers-can-activate-sell-side-targeting/ (last accessed July 25, 2024) ("Sell-side targeting enables publishers to monetize even more inventory[.]").

[20] "Poll: Americans Want Free Internet Content, Value Interest-Based Advertising," *American Association of Advertising Agencies*, April 18, 2023, available at https://www.aaaa.org/pollamericanswantfreeinternetcontentvalueinterest-basedadvertising/ (last accessed July 25, 2024) ("Nearly 70 percent of respondents indicated that they'd like at least some ads tailored directly to their interests[.]").

26.   Facilitating such matches is highly valuable economically.[21] Each day, this matching process leads to transactions for billions of impressions. For example, Google's ad exchange transacted about ▮▮▮▮ Open Auction impressions per day in the United States during 2022.[22]

27.   There are a host of intermediaries that facilitate this complex process of placing an impression in front of the user. Collectively, these intermediaries constitute what is called the "Ad Tech Stack." Each intermediary plays a role in helping publishers optimize sales of their ad inventory and in helping advertisers learn and optimize their ad spend, enhancing the overall efficiency and value of the matching process. Intermediaries in the Ad Tech Stack include (among others) publisher ad servers, ad buying tools, and ad exchanges. In addition, as discussed in Section II.B.2, advertising agencies help advertisers monitor performance, learn, and adjust strategies and budgets accordingly.

28.   Publisher ad servers are "responsible for storing, managing, and serving ads on a publisher's website based on targeting attributes," via both real time bids and direct deals.[23] Google used to offer publisher ad server functionality through DoubleClick For Publishers ("DFP"), and that functionality has now been incorporated into Google Ad Manager ("GAM").[24] Other publisher ad servers include, for example, Equativ's Smart AdServer,[25] Microsoft's Xandr (formerly AppNexus),[26] and Comcast's Freewheel.[27]

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[21] According to a December 2023 forecast, US programmatic digital display ad spend will total $157.35 billion in 2024. See "Guide to programmatic advertising: Market, types, and buying process explained," *eMarketer*, February 14, 2024, available at https://www.emarketer.com/insights/programmatic-digital-display-ad-spending/ (last accessed July 25, 2024).

[22] Calculation based on Google's AdX Data (for data sources and calculations, see workpaper "Daily AdX Transactions in 2022.xlsx").

[23] Zaiceva, Alise, "What is an Ad Server? | A Complete Guide for Publishers," *Setupad Blog*, September 1, 2023, available at https://setupad.com/blog/ad-server/ (last accessed July 25, 2024); Zawadziński, Maciej and Mike Sweeney, "What is an Ad Server and How Does It Work?," *Clearcode*, March 7, 2018, available at https://clearcode.cc/blog/what-is-an-ad-server/ (last accessed July 25, 2024).

[24] In 2018, GAM combined the features of two former services, DFP (offering publisher ad server services) and AdX (offering ad exchange services). See GOOG-AT-MDL-C-000015714 at -714-720.

[25] Nelson, Marisa, "Smart AdServer Rebrands as Equativ," *Equativ*, June 8, 2022, available at https://equativ.com/blog/press-release/smart-adserver-rebrands-as-equativ/ (last accessed July 25, 2024).

[26] Bagatsky, Eugene, "Best Ad Servers for Publishers (in 2022)," *Snigel*, January 20, 2022, available at https://snigel.com/blog/best-ad-servers-for-publishers (last accessed July 25, 2024).

[27] "Comcast buys advertising startup Freewheel for $360 million," *Reuters*, March 6, 2014, available at https://www.reuters.com/article/idUSL1N0M31GL/ (last accessed July 25, 2024); "For Sellers: SupplySuite," *FreeWheel*, available at https://www.freewheel.com/supplysuite (last accessed July 25, 2024).

Prices for these publisher ad servers typically take the form of fixed per-transaction fees

███.[28]

29.   Intermediaries on the buying side include demand side platforms ("DSPs") and other ad
buying tools.[29] Google operates two popular ad buying tools: Google Ads and DV360.
Other ad buying tools include, e.g., The Trade Desk,[30] Adobe,[31] and Amazon DSP.[32]

30.   Ad buying tools serve as an interface between advertisers and the remainder of the Ad
Tech Stack. Advertisers that wish to place ads programmatically provide their ad buying
tools with advertising budgets, together with other campaign constraints and objectives.[33]
Besides budgets, common advertiser constraints include the maximum amount to bid,[34]
the rate at which the budget is spent,[35] the maximum amount to spend per viewable
impression,[36] and the average cost over multiple conversions.[37] Advertisers also can

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████████████████████████████████████ see also "Vocento Enters
Partnership with Smart," *ExchangeWire*, January 5, 2022, available at
https://www.exchangewire.com/blog/2022/01/05/vocento-enters-partnership-with-smart/ (last accessed July 25,
2024) ("Equativ is the new single name for Smart Adserver[.]").

[29] I understand that plaintiffs allege that there are distinct antitrust markets for (a) buying tools for small advertisers;
and (b) buying tools for large advertisers. See Fourth Amended Complaint, *State of Texas*, *et al. v. Google LLC*, 4:20-
cv-00957-SDJ (E.D. Tex. May 5, 2023) ("FAC") ¶¶ 163-186, 196-214. My analysis does not depend on such
distinctions, and I use the terms "ad buying tools" and "DSPs" interchangeably to refer to all buy-side intermediaries.

[30] "Demand Side Platform: Achieve your marketing goals," *The Trade Desk*, available at
https://www.thetradedesk.com/us/our-platform/dsp-demand-side-platform (last accessed July 25, 2024).

[31] "One demand-side platform to rule them all," *Adobe*, available at
https://business.adobe.com/products/advertising/demand-side-platform.html (last accessed July 25, 2024).

[32] "Amazon DSP: Your brand in new places," *Amazon*, available at
https://advertising.amazon.com/solutions/products/amazon-dsp (last accessed July 25, 2024).

[33] 30(b)(1) Deposition of ████████████ (Google), April 25, 2024 ("30(b)(1) ████████ (Google) Deposition"), at
256:11-12 ("And constraints, budget is one example, but advertisers might give us more constraints as well.").

[34] "Choose a bid amount that works for you," *Google*, available at https://support.google.com/google-
ads/answer/2471184?hl=en (last accessed July 25, 2024).

[35] "Set budgets and control your pacing," *Google*, available at
https://support.google.com/displayvideo/answer/3114676?hl=en (last accessed July 25, 2024).

[36] "About bidding on impressions," *Google*, available at https://support.google.com/google-
ads/answer/2630842?hl=en (last accessed July 25, 2024) ("With vCPM bidding, you bid for your ad based on how
often it appears in a viewable position. … You set the max amount you want to pay for viewable ads, whether they're
clicked or not.").

[37] "About Target CPA bidding," *Google*, available at https://support.google.com/google-ads/answer/6268632?hl=en
(last accessed July 25, 2024) ("Some conversions may cost more than your target and some may cost less, but
altogether, Google Ads will try to keep your cost per conversion equal to the target CPA you set.").

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impose common targeting constraints, such as by website, geography, devices, and demographics. [38] Ad buying tools operate within the constraints and objectives provided by advertisers and their advertising agencies.

31.   Advertisers can also choose the basis on which they will pay for display advertisements. It is useful to divide these alternatives into payments for impressions, where prices are denominated on a cost-per-mille (i.e., per-thousand) impressions (CPM) basis, and payments that occur on a cost-per-click (CPC) or cost-per-action (CPA) basis.[39] When advertisers pay on a CPM basis, the ad buying tool prepares bids consistent with advertiser budgets, constraints, objectives, and willingness to pay, and then collects a buy-side fee from the advertiser.[40]

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[39] 30(b)(6) Deposition of ████████████████████████████████████ at 92:9-12 ██ Many ad buying tools offer CPC pricing. See, for example, Google Ads ("Cost-per-click (CPC): Definition," *Google*, available at https://support.google.com/google-ads/answer/116495?hl=en (last accessed July 25, 2024)), DV360 (During the period covered by the DV360 data, about less than 1% of the impressions were paid on a CPC basis. For sources and calculations, see workpaper "DV360 Impressions by Advertiser Payment Model.xlsx"); TheTradeDesk ("Campaign," *The Trade Desk*, available at https://partner.thetradedesk.com/v3/portal/api/doc/Campaign (last accessed July 25, 2024) (CPC pricing description states "the amount the advertiser pays every time an ad is clicked. If your primary engagement metric is clicks, you may want to choose CPC as your goal")); Microsoft's Xandr ("Microsoft Invest – Set up line item optimization," *Microsoft Xandr Platform*, February 19, 2024, available at https://learn.microsoft.com/en-us/xandr/invest/set-up-line-item-optimization (last accessed July 25, 2024) (under "Set a goal type," the website states "Select this type if your advertiser wants to track and report against a cost per click goal. Enter the CPC amount in the text field.")); and Amazon Ads ("CPC (Cost per Click) explained," *Amazon*, available at https://advertising.amazon.com/library/guides/cost-per-click (last accessed July 25, 2024) (Under "What is CPC?," the website states "CPC is the cost per click that an ad receives")).

[40] Various ad buying tools collect fees using technically different, but economically similar, mechanisms. For example, some deduct fees from bids and others add a charge to the bid amount. See "Display & Video 360 Help: Total Media Cost," *Google*, available at https://support.google.com/displayvideo/answer/3007271?hl=en (last accessed July 25, 2024) (explaining that DV360 adds its platform fees and any other third-party fees (such as data fees, ad server fees, ad serving verification fees) to its price of buying impressions (media cost)); "Microsoft Monetize – Charges for buyers," *Microsoft Xandr Platform*, February 26, 2024, available at https://learn.microsoft.com/en-us/xandr/monetize/charges-for-buyers (last accessed July 25, 2024) (explaining that

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32.   When advertisers pay on a CPC or CPA basis, the advertiser similarly sets up budgets, constraints and objectives, commonly including a maximum CPC or maximum CPA that it is willing to pay.[41] The ad buying tool then incorporates these restrictions, decides on which impressions to bid, and uses its own algorithms to determine how much to bid for those impressions on a CPM basis.[42]

33.   The vast majority of Google Ads advertisers choose to pay for impressions on a CPC or CPA basis. In each year from 2012 to 2023, more than ██ percent of display impressions purchased by advertisers using Google Ads were paid for on a CPC or CPA basis.[43]

34.   When advertisers choose to pay on a CPC or CPA basis, the ad buying tool buys many impressions and receives no payment from the advertiser for most of them.[44] But when a click or action does occur, the ad buying tool receives a payment that, in general, exceeds

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Xandr DSP offers a choice on how its platform fee is charged; the platform fee can either be charged as a reduction in its bid amount or as a separate fee added to its price of buying impressions).

[41] Strategies tailored to secure such other actions can be accomplished by what Google terms "Target CPA bidding," where "CPA" stands for cost per action. Google explains that "[t]arget CPA bidding is an automated bid strategy that sets bids for you to get as many conversions or customer actions as possible. When you select the Target CPA (cost-per-action) bid strategy, you set your desired average cost per conversion. Google Ads uses your Target CPA to set a bid based on the likelihood of the ad to convert." "About Target CPA bidding," *Google*, available at https://support.google.com/google-ads/answer/6268632?hl=en (last accessed July 25, 2024); see also 30(b)(6) Deposition of ████████ (Google), April 26, 2024 ("30(b)(6) ██████ (Google) Deposition"), at 21:10-22:1 ("There are different kinds of GDN advertisers. There are advertisers who specify that, for example, spend my budget, give me as many conversions as possible, but charge me a fixed cost per conversion. So in those cases, for example, they would just be charged that fixed cost per conversion that they wanted to be charged. There are such other categories of advertisers who may specify, I want to be charged a certain cost per conversion; and they would be charged a certain cost per conversion. And then there are some advertisers who do not express that – objectives in that way. Rather, they might specify a maximum bid to win that they're willing to pay. And in those cases, we would charge them the as if it was a second-price auction.").

[42] See GOOG-TEX-00993980 at -981, -991 ("The GDN auction decides which ads we serve to users for each query. As with any auction, we can design the auction to maximize the welfare of different participants. The GDN auction is designed to maximize the welfare of all advertisers, and emphasize fairness.… ████████████████████ ███ ███ ██████████████████████████████████ .

[43] Calculation based on Google's AdX Data (for data sources and calculations, see workpaper "Google Ads Impressions by Advertiser Payment Model.xlsx").

[44] The vast majority of display impressions do not lead to a click. Click-through rate (i.e., the ratio of number of clicks and number of impressions) for display ads is typically below 1%. See Raehsler, Lisa, "What is a Good CTR? Is Your Click-Through Rate Good Enough?," *Agency Analytics*, May 19, 2023, available at https://agencyanalytics.com/blog/average-click-through-rate (last accessed July 25, 2024). According to Google's AdX data, Google Ads on average purchased ████ impressions for each click that it purchased in open auctions in the U.S. during 2016-2023 (for data sources and calculations, see workpaper "Google Ads Impressions Purchased per Click.xlsx").

the cost of the many impressions purchased to obtain that one click or action. As a result, the buying tool's margin (or revenue share) becomes an amalgamation associated with outgoing payments made for many impressions, but only a single incoming payment made for the click or action. On average, Google Ads has sought to retain 14 or 15 percent of the payments made by advertisers, with the remainder spent on payments for impressions won by the advertiser.[45]

35.   To translate an advertiser's willingness-to-pay for a click (known as maxCPC) into an amount the ad buying tool is willing to bid (typically expressed as an eCPM), the ad buying tool must assess the likelihood that each impression will lead to a click, which is called the predicted click-through-rate or pCTR.[46] This pCTR and other factors are used by the ad buying tool to determine how much the tool will bid into the auction on a CPM basis.[47]

36.   Ad buying tools, including Google Ads, have a strong incentive to provide clicks at low cost.[48] When the ad buying tool can supply clicks at a lower cost, the advertiser is better able to meet its campaign goals, and it will willingly buy more such clicks until its budget is fully utilized. And when the CPCs that advertisers pay are low, advertisers enjoy higher returns.[49] Those returns attract more spending and still larger budgets to the ad buying

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[45] See GOOG-AT-MDL-C-000009970 at -973 ("GDN maintains a desired margin of 14% for 'fair' payout to pub[.] Note that we can not achieve 14% on every query because we pay per impression and receive revenue per click. Aim for 14% margin in expectation (over a set of queries)"); 30(b)(1) ▮▮▮▮▮ (Google) Deposition at 43:1-6 ("at some point", Google Ads' target margin was changed to 15% and that, today, "[i]n aggregate, Google's margin on buying on AdX continues to be 15 percent.").

[46] GOOG-TEX-00993980 at -983 (presenting the relationship between the "maximum estimated/expected cost per mille (MaxEcpm) to maxCPC and pCTR in Google Ads). The click through rate (CTR, i.e., the ratio of number of clicks and number of impressions) for display ads is typically below 1%. Raehsler, Lisa, "What is a Good CTR?: Is Your Click-Through Rate Good Enough?," *Agency Analytics*, May 19, 2023, available at https://agencyanalytics.com/blog/average-click-through-rate (last accessed July 25, 2024).

[47] ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

[48] Providing clicks at the lowest possible cost includes achieving low CPMs, but also includes allocating money to impressions most likely to generate a click for a given advertiser. See, e.g., 30(b)(1) ▮▮▮▮ (Google) Deposition at 306:1-6 ("[A] negative profit refers to losing money and it's pretty common because of the nature of the AdWords [now known as Google Ads] model where advertisers only pay when there's a click, but we have to pay the publisher on every impression.").

[49] 30(b)(1) ▮▮▮▮ (Google) Deposition at 69:3-5 ("So it's critical for us to give good performance if you want to continue to attract advertiser budgets."); *id.* at 82:23-83:1 ("[T]he goal is to build a better product for AdWords advertisers; that we're hoping they would continue to use it and bring in more budgets to AdWords."); *id.* at 27:23-25

tool.[50] As described more fully below, advertisers generally focus on the returns generated by their campaigns, and they compare the performance of various ad buying tools in helping them achieve their goals.[51]

37.   A portion of the advertiser's budget may remain unspent if the ad buying tool is unable to find sufficient clicks at prices below the advertiser's maxCPC. In the earliest period for which data is available, which appears to be ███, these "budget unconstrained advertisers" ███████████████ ███████████ ████████████ ███████████████████████████████████████. As described below, Google Ads invented a bidding strategy–known as Bernanke–to provide more clicks (without exceeding the maxCPC), thus benefiting both Google Ads and its advertiser customers. Google Ads benefited by receiving a buy-side margin on a larger portion of advertisers' budgets, and the advertisers benefited because they were able to acquire more clicks at a price at or below their maximum CPCs.[53]

38.   Ad buying tools bid into ad exchanges, sometimes called supply-side platforms or "SSPs."[54] Ad exchanges conduct online auctions for inventory and collect payments from

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("Google buy-side is trying to buy ad inventory the best possible way for advertisers to maximize advertiser value.") *id.* at 127:16-22 ("advertisers are giving us a budget and trusting us to deliver the best performance that we can deliver. And doing so is critical for AdWords to be a successful product. And hence overpaying and providing suboptimal value for advertisers is not in AdWords' interest as a buy-side product.").

[50] 30(b)(1) ███████ (Google) Deposition at 60:22-25 and 62:4-9 ("My hope is that by launching quality improvements such as Bernanke and other improvements that we made over the years, more advertisers have used AdWords. …Advertisers' payments to Google, like I said, you know, it depends on performance and my hope is by improved performance, advertisers also use the product more and bring in more … budgets.").

[51] See, e.g., ███████████████████████████████████████ ███████████████████████████ ██████████

[52] GOOG-DOJ-13625417 at -419 (indicating that "██% of GDN advertisers are budget unconstrained."). This presentation indicates that the "current status" of the work to which it refers was as of the ███████████ ██████ See *id.* at -426. Other slides in this presentation likewise refer to information from ███. See, e.g., *id.* at -433.

[53] Profit-maximizing advertisers will set their maximum CPC so that it is less than or equal to the benefit the advertiser expects to receive from the click. As a result, advertisers are made better off whenever Google Ads can provide clicks below their maximum CPCs. This is in accord with the fundamental economic principle that profit maximizing firms act to equate the marginal revenue from an action equal to the marginal cost of that action. See, e.g., Mankiw N., Gregory, Ronald D. Kneebone, and Kenneth J. McKenzie, *Principles of Microeconomics*, 10th Canadian ed. 2017, at 307 ("[There are] three general rules for profit maximization: 1. If marginal revenue is greater than marginal cost, the firm should increase its output. 2. If marginal cost is greater than marginal revenue, the firm should decrease its output. 3. At the profit-maximizing level of output, marginal revenue and marginal cost are exactly equal. These rules are the key to rational decision making by any profit-maximizing firm. They apply not only to competitive firms but, as we will see in the next few chapters, to other types of firms as well.").

[54] See, e.g., "What is a Supply-Side Platform (SSP)? Here's everything you need to know," *Amazon Ads*, available at

winning bidders, and then deduct the ad exchange's revenue share before remitting the balance to publishers. Transactions on ad exchanges are commonly carried out using first-price or second-price auctions.[55] Google's ad exchange, AdX, has been integrated into Google Ad Manager (GAM).[56] There are many other ad exchanges, including Xandr, OpenX, Magnite, Pubmatic, and Index Exchange.[57]

B. Learning-By-Doing in the Ad Tech Industry

39.   A proper economic assessment of the issues in this case requires understanding the

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https://advertising.amazon.com/library/guides/supply-side-platform (last accessed July 25, 2024); Wlosik, Michal and Maciej Zawadziński, "What Is a Supply-Side Platform (SSP) and How Does It Work?," *Clearcode*, January 31, 2024, available at https://clearcode.cc/blog/what-is-supply-side-platform/ (last accessed July 25, 2024).

[55] For a discussion of the economics of first- and second-price auctions, see, for example, Villas-Boas, Sofia B., "An Introduction to Auctions," *Journal of Industrial Organization Education*, Vol. 1, Issue 1, Article 5, 2006, explaining that in first price auctions, the bidder who submits the highest bid wins the auction and is charged its bid. Economic theory teaches that, in first-price auctions, advertisers have an incentive to reduce (or "shade") their bids below their willingness to pay for the impression. The basic intuition is that, if the advertiser bids its willingness to pay and wins, it obtains no "surplus" from the auction (where advertiser surplus is the difference between the maximum amount that the advertiser would be willing to pay for an impression and what it actually pays for the impression). In such instances, the winning bidder is no better off than had it not offered a bid in the first instance. But if the advertiser wins when bidding below its willingness to pay, then it achieves a positive surplus. According to auction theory, the optimal amount of shading is the result of a trade-off between (i) a lower likelihood of winning from more shading, and (ii) a higher surplus from more shading when the advertiser does win the auction.

In second price auctions, on the other hand, the bidder who submits the highest bid wins the auction and is charged the second-highest bid or, when it is higher, the reserve or floor price for the auction. Only bids above the "floor" price can win an auction. When all bids are below the floor price for an online display ad auction, the auction is said to have not "cleared," meaning that no bidder in that auction wins the impression. In a static (i.e., non-repeated) second-price auction, advertisers have an incentive to bid their willingness to pay for the impression that is being auctioned off. The basic intuition why advertisers would not bid less than their willingness to pay in a second-price auction is that doing so would reduce the advertiser's likelihood of winning the auction, but it would not lower the price it would pay if it wins the auction. This price depends on only the second highest bid (and not the winner's bid). If a bidder needs to increase its bid above its willingness to pay in order to win an auction, then it will necessarily suffer a loss from winning the auction because it will end up paying more than its willingness to pay.

[56] See, e.g., Ramaswamy, Sridhar, "Introducing simpler brands and solutions for advertisers and publishers," *Google*, June 27, 2018, available at https://blog.google/technology/ads/new-advertising-brands/ (last accessed July 25, 2024); Marvin, Ginny, "Google is Retiring the AdWords & DoubleClick Brands in a Major Rebranding Aimed at Simplification," *Search Engine Land*, June 27, 2018, available at https://searchengineland.com/google-is-retiring-the-adwords-doubleclick-brands-in-a-major-rebranding-aimed-at-simplification-301073 (last accessed July 25, 2024) ("Google is also introducing some new solutions that further the push toward simplifying its advertising offerings.… DoubleClick for Publishers and DoubleClick Ad Exchange are integrated into a new unified platform called Google Ad Manager.").

[57] See Trevisani, Jonathan, "The Best Ad Exchanges for Publishers in 2024," *Playwire*, available at https://www.playwire.com/blog/best-ad-exchanges-for-publishers (last accessed July 25, 2024); "What is a Supply-Side Platform (SSP)? Here's everything you need to know," *Amazon Ads*, available at https://advertising.amazon.com/library/guides/supply-side-platform (last accessed July 25, 2024); "What Is a Supply-Side Platform (SSP) and How Does It Work?," *Clearcode*, available at https://clearcode.cc/blog/what-is-supply-side-platform/ (last accessed July 25, 2024).

behavior of advertisers and publishers. Such understanding in turn requires taking into account the information available to and provided by various market participants, and understanding how participants use this information to learn and to adjust their behavior. This approach is rooted in the substantial and well-regarded economic literature on learning, as well as the evidence in this case. That evidence shows that advertisers, ad buying tools, and advertising agencies generally learn how to optimize returns on ad purchases through careful experimentation and monitoring of their spending. Publishers also generally monitor returns and conduct experiments to identify strategies to optimize their revenue, such as through setting price floors.

40.   Plaintiffs' theory unduly emphasizes the role of announcements about optimization features,[58] despite the evidence that advertisers typically do not pay attention to them.[59] Plaintiffs' theory further fails to take into account the evidence that advertisers and publishers learn through experimentation and rely on numerous specialized intermediaries

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[58] FAC ¶¶ 328 ("Google … withheld critical information that the parties could have used to make an informed decision about the program"), 343 ("Google did not disclose … and misled publishers and advertisers as to how the program worked."), and 538 ("[A]dvertiser's bid data was used against them to increase the floor price in an auction and each time an advertiser paid more for an impression they otherwise would have had they not been misled by Google's misstatements or had RPO been properly disclosed[.]").See also Expert Report of Parag Pathak, June 7, 2024, ("Pathak Report") at ¶¶ 197 ("Had publishers and advertisers known about these programs, they would have the opportunity to adjust their behavior"), 268 ("[I]f publisher and advertisers knew how the deception changed the rules of the auction, they could change their behavior. If publishers and advertisers knew the rules of the auction, they may choose to set floors or bids in a way where another exchange would win over AdX."); Expert Report of Joshua Gans, June 7, 2024 ("Gans Report") at ¶ 15 ("Had Google's customers known about Google's manipulations of the auction rules that customers were accustomed to, customers would have considered products from Google's competitors."); Expert Report of Matthew Weinberg, June 7, 2024 ("Weinberg Report") at ¶ 250 ("[A]ll publishers likely would have changed their behavior if they knew about Projects Bernanke and Global Bernanke by raising their reserve prices.").

[59] [redacted]

to help them implement optimal strategies.

41.   In Section II.B.1, I discuss the economic literature on learning-by-doing. Section II.B.2 describes various features of the Ad Tech industry that facilitate advertiser learning, as well as the evidence regarding how advertisers generally learn and seek to maximize their returns. In Section II.B.3, I discuss the evidence of similar behavior by publishers.

1. *Learning-by-Doing Literature*

42.   Economists have long recognized learning-by-doing as an important phenomenon, beginning at least as early as the work of Nobel laureate Kenneth Arrow.[60] Subsequent work has applied learning-by-doing to various industries, demonstrating how learning can help decision-makers optimize in complex environments.[61] For example, there is ample research applying learning-by-doing in industries including agriculture,[62] aircraft manufacturing,[63] shipbuilding,[64] power plant design,[65] oil production,[66] and electricity auctions.[67]

43.   Recent empirical work has highlighted the importance of experimentation in facilitating

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[60] See, e.g., Arrow, Kenneth J., "The Economic Implications of Learning by Doing," *The Review of Economic Studies*, Vol. 29, No. 3, 1962, pp. 155-173; Fudenberg, Drew and David K. Levine, "Learning and Equilibrium," *Annual Review of Economics*, Vol. 1, No. 1, 2009, pp. 385–419; Doraszelski, Ulrich, Gregory Lewis, and Ariel Pakes, "Just Starting Out: Learning and Equilibrium in a New Market," *American Economic Review*, Vol. 108, No. 3, 2018, pp. 565-615.

[61] See e.g., List, John A, "Does Market Experience Eliminate Market Anomalies?," *Quarterly Journal of Economics*, Vol. 118, No. 1, 2003, pp. 41-71; Goke, Shumpei, Gabriel Y. Weintraub, Ralph Mastromonaco, and Sam Seljan, "Bidders' Responses to Auction Format Change in Internet Display Advertising Auctions," *Working Paper*, January 2022 ("Goke, et al. (2022)"); Argote, Linda, Sara L. Beckman, and Dennis Epple, "The Persistence and Transfer of Learning in Industrial Settings," *Management Science*, Vol. 36, No. 2, 1990, pp. 140-154.

[62] Foster, Andrew D. and Mark R. Rosenzweig, "Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture," *Journal of Political Economy*, Vol. 103, No. 6, 1995, pp. 1176-1209.

[63] Bernkard, Lanier C., "Learning and Forgetting: The Dynamics of Aircraft Production," *American Economic Review*, Vol. 90, No. 4, 2000, pp. 1034-1054. Research on learning-by-doing in aircraft manufacturing dates back to 1950. See Alchian, Armen A., "Reliability of Progress Curves in Airframe Production," Working Paper, *RAND Corporation*, 1950.

[64] Thompson, Peter, "How Much Did the Liberty Shipbuilders Forget?" *Management Science*, Vol. 53, No. 6, 2007, pp. 908-918.

[65] McCabe, Mark J., "Principals, Agents, and the Learning Curve: The Case of Steam-Electric Power Plant Design and Construction," *The Journal of Industrial Economics*, Vol. 44, No. 4, 1996, pp. 357-375.

[66] Kellog, Ryan, "Learning by Drilling: Interfirm Learning and Relationship Persistence in the Texas Oilpatch," *The Quarterly Journal of Economics*, Vol. 126, No. 4, 2011, pp. 1961-2004.

[67] Hortaçsu, Ali, Fernando Luco, Steven L., Puller, and Dongni Zhu, "Does strategic ability affect efficiency? Evidence from electricity markets," *American Economic Review*, Vol. 109, No. 12, 2019, pp. 4302-4342.

optimal decision-making.[68] The extensive nature of this literature and its importance are such that the topic warrants an entire chapter in the highly prestigious Handbooks in Economics series.[69]

44.   This academic literature has been applied to study learning in the types of Ad Tech auctions at issue in this case. For example, a recent paper studied bidding behavior during the interval of time when Xandr (formerly known as AppNexus) switched its display advertising auction from a second-price to a first-price format.[70] The paper found that bidders (which were typically buy-side intermediaries such as DSPs) did not adjust their bids immediately; they learned over time how to adjust their bids in response to the format change. In particular, the authors found that "bidders learn over time how to better shade their bids using a combination of first-hand experience and industry-wide learning."[71] This pattern indicates that bidders experiment and learn, a form of learning-by-doing.[72]

2. Industry Characteristics and Advertiser Learning

45.   Several features of the Ad Tech industry facilitate learning by advertisers, and thus have direct implications for evaluating the effect of Google's allegedly deceptive conduct.

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[68] See Luca, Michael and Max H. Bazerman, *The Power of Experiments: Decision Making in a Data-Driven World*, Cambridge: MIT Press, 2021, at vii-viii ("These days, companies like Google wouldn't dare make a major change in their platforms without first looking at experiments to understand how it would influence user behavior. From startups to international conglomerates to government agencies, organizations have a new tool to develop frameworks and test ideas, and to understand the impact of the products and services they are providing."); *id.* at 62 ("But perhaps no sector has embraced the experimental method more than the tech sector, where it is now a standard component of managerial decision making."). See also Wieland, Volker, "Learning by Doing and the Value of Optimal Experimentation," *Journal of Economic Dynamics and Control*, Vol. 24, 2000, pp. 501-534.

[69] See Thompson, Peter, "Chapter 10 – Learning by Doing," *Handbook of the Economics of Innovation*, Vol. 1, 2010, pp. 429-476.

[70] Goke, Shumpei, Gabriel Y. Weintraub, Ralph Mastromonaco, and Sam Seljan, "Bidders' Responses to Auction Format Change in Internet Display Advertising Auctions," *Working Paper*, January 2022 at 16 ("[T]hese bidders gradually learned to shade their bids to a level sustained by a rational strategy.").

[71] Goke, et al. (2022) at 4.

[72] Goke, et al. (2022) at 4 ("Our results suggest that existing auction theory can fail to correctly predict bidder behavior in the short run, which is an important fact for market designers. In the short run, bidders may have trouble bidding optimally and so it may appear that first-price auctions are driving price increases. As a result, it is easy for myopic market designers to draw a wrong conclusion that a format change increases prices. However, over the long run, as bidders adjust to market dynamics and learn to bid more effectively, the price increase dissipates."). Other research similarly concludes that learning by doing does a good job of explaining behavior in other markets. See, e.g., Doraszelski, Ulrich, Gregory Lewis, and Ariel Pakes, "Just starting out: Learning and equilibrium in a new market," *American Economic Review*, Vol. 108, No. 3, 2018, pp. 565-615; Hortaçsu, Ali, Fernando Luco, Steven L. Puller, and Dongni Zhu, "Does strategic ability affect efficiency? Evidence from electricity markets," *American Economic Review*, Vol. 109, No. 12, 2019, pp. 4302-42.

These features include: (a) advertisers' use of sophisticated ad buying tools that provide
them with metrics on their advertising effectiveness (such as return on ad spend), which
advertisers generally use to learn and optimize over time; (b) advertisers' use of
advertising agencies that help them evaluate returns and allocate budgets across ad buying
tools; (c) competitive pressures for advertising dollars—rooted in the monitoring of
returns by advertisers and agencies, as well as the simultaneous use of multiple ad buying
tools—that incentivize ad buying tools to continually learn and adapt; (d) the presence of
continuous and meaningful feedback; and (e) the ease with which advertisers, advertising
agencies, and ad buying tools can conduct experiments. The net impact of these factors is
that advertisers need not, as a general matter, know all of the details about how Ad Tech
optimizations and auctions operate. Instead, they (or their ad buying tools and ad agencies)
continuously learn what strategies work best to maximize return on ad spend and adapt to
implement those strategies.

a.   Advertisers Rely on Sophisticated Ad Buying Tools

46.   The *first* important feature of this industry is the presence of sophisticated ad buying tools
(including non-Google services,[73] as well as Google's DV360 and Google Ads[74]) that

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[73] Criteo explicitly points to the fact that since 2014 its bidding strategies have been honed over time based on
learning from many transactions. Specifically, Criteo states that its Predictive Bidding feature "determines the right
bid for every impression" because it is "Powered by 900TB of consumer data on the interactions between 700M
shoppers and 4B products." See "What is Predictive Bidding," *Criteo*, available at
https://www.criteo.com/technology/predictive-bidding (last accessed July 25, 2024); see also "What You Need to
Know About First-Price Auctions and Criteo," *Criteo*, September 12, 2019, available at
https://www.criteo.com/blog/first-price-auctions (last accessed July 25, 2024) ("Five years ago, Criteo started
developing a smart bidding technology. This technology ensures a bid placed for any display opportunity offers the
highest yield for clients and publishers. Criteo's state of the art bidder in non-pure second-price auctions is constantly
improving. This accounts for bidding in both first-price and ever more complex environments.").Other DSPs,
including Amazon and The Trade Desk, also offer optimization tools for advertisers. See "Sponsored Display custom
bid optimizations," *Amazon Ads*, available at https://advertising.amazon.com/library/guides/sponsored-display-
custom-bid-optimizations (last accessed July 25, 2024) ("When creating a campaign, you can optimize bidding for
your specific needs by selecting one of the following optimizations: 'Optimize for Page Visits,' 'Optimize for
conversions,' or 'Optimize for viewable impressions.'"); "Targeting and Optimization," *The Trade Desk*, available at
https://partner.thetradedesk.com/v3/portal/api/doc/TargetingOptimizationOverview (last accessed July 25, 2024);
"Optimization buying strategies," *Microsoft Xandr Platform*, available at https://learn.microsoft.com/en-
us/xandr/monetize/optimization-buying-strategies (last accessed July 25, 2024).

[74] Similarly, Automated Bidding is a Google Ads service that "sets bids for your ads based on that ad's likelihood to
result in a click or conversion that helps you achieve a specific goal for your business." "About Automated Bidding,"
Google, available at https://support.google.com/google-ads/answer/2979071?hl=en (last accessed July 25, 2024).

compete to help advertisers purchase impressions and track performance.[75] These ad

buying tools greatly simplify advertiser decision-making because they choose the

impressions on which to bid and prepare and submit bids into auctions.[76] This means that

instead of focusing on auction dynamics, the impressions to bid on, and how much to bid,

advertisers can simply assess the cost effectiveness of and returns generated by these ad

buying tools.[77]

47.   Advertisers can focus on performance in part because the ad buying tools provide them

        with ready, salient, and valuable metrics by which they can measure the effectiveness of

        ad campaigns.[78] These metrics include return on ad spend ("ROAS") or return on

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[75] See GOOG-AT-MDL-004253447 at -461, -473, (highlighting the need for Google Ads' autobidding tool "to defend performance in competitive landscape" and the "need to differentiate" from "new low cost RTB services [i.e., real time bidding tools] … [which] provide smart RTB at a low price point (and may reach more inventory too). We need to differentiate: (i) prove value of our algorithms vs. basic rules; (ii) highlight value of network quality and spam controls.").

[76] See, e.g., GOOG-AT-MDL-004253447 (describing how "managing bids for all possible auctions is impossible and unnecessarily complex for advertisers. We should have an autobidding strategy for all advertiser's goals"); 30(b)(1) ████ (Google) Deposition at 260:10-16 ("[Value computation is] based on the objectives and constraints that advertisers set and ... just as an example, some advertiser might say maximize conversions subject to budget and then our job is to translate that into an assessment of value."); ██

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[77] Publishers also seem to be aware that advertisers use the sophisticated algorithms employed by ad buying tools.

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[78] See "About target ROAS bidding," *Google*, available at https://support.google.com/google-ads/answer/6268637?hl=en (last accessed July 25, 2024); "About optimization score," *Google*, available at https://support.google.com/google-ads/answer/9061546 (last accessed July 25, 2024).

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investment ("ROI"),[79] click-through rates ("CTR"),[80] cost per click ("CPC"),[81] and cost
per action ("CPA").[82] For ease of exposition, I refer to these various measures as "return
metrics." All of these measures relate directly to the advertiser's ultimate advertising
objective, which is to increase returns on ad spend.[83] There is strong evidence that
advertisers can and do use these return metrics to assess the relative effectiveness of
various strategies.[84]

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[79] Return On Ad Spend "measure[s] gross revenue generated for every dollar spent on advertising. A useful metric for
determining the effectiveness of an online campaign, ROAS help advertisers gauge what's working and how they can
improve future efforts." "Top 10 Retargeting Acronyms to Help You Crush Your Campaigns," *Criteo*, available at
https://www.criteo.com/wp-content/uploads/2017/07/Report-criteo-the-smart-marketers-guide-to-retargeting-
acronyms-one-pager.pdf (last accessed July 25, 2024); Mayer, Tim, "ROI Vs. ROAS: Which Is The Better Metric For
Digital Advertisers?," *AdExchanger*, February 13, 2015, available at https://www.adexchanger.com/data-driven-
thinking/roi-vs-roas-which-is-the-better-metric-for-digital-advertisers/ (last accessed July 25, 2024); Beattie, Andrew,
"How to Calculate the Return on Investment (ROI) of a Marketing Campaign," *Investopedia*, July 4, 2024, available
at https://www.investopedia.com/articles/personal-finance/053015/how-calculate-roi-marketing-campaign.asp (last
accessed July 25, 2024) ("The most basic way to calculate the ROI of a marketing campaign is to integrate it into the
overall business line calculation. You take the sales growth from that business or product line, subtract the marketing
costs, and then divide by the marketing cost."). ███████████████████████████
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[80] "In online advertising, the click-through rate (CTR) is the percentage of individuals viewing a web page who view
and then click on a specific advertisement that appears on that page. Click-through rates measure how successful an
ad has been in capturing users' attention. The higher the click-through rate, the more successful the ad has been in
generating interest." Hayes, Adam, "Click-Through Rate (CTR): Definition, Formula, and Analysis," *Investopedia*,
December 22, 2022, available at https://www.investopedia.com/terms/c/clickthroughrates.asp (last accessed July 25,
2024). CTR is a common performance metric used by advertisers. ██████████████████
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[81] "Cost per click (CPC) is an online advertising revenue model that websites use to bill advertisers based on the
number of times visitors click on a display ad attached to their sites." "Cost Per Click (CPC) Explained, With
Formula and Alternatives," *Investopedia*, June 28, 2023, available at https://www.investopedia.com/terms/c/cpc.asp
(last accessed July 25, 2024). CPC is a common performance metric used by advertisers. ██████████
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[82] "Cost per action (CPA) is a pricing model in which marketers pay ad networks or media sources when a user takes
a particular action (such as completing a purchase or registration) inside of an app, after engagement with an ad. […]
If you spend $1,000 advertising the trial, and 200 people sign up, your CPA is: $1000 / 200 = $5." "Cost per action
(CPA)," *AppsFlyer*, available at https://www.appsflyer.com/glossary/cpa/ (last accessed July 25, 2024). CPA is a
common performance metric used by advertisers. ████████████████████████
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[83] The exact nature of the return may vary across advertisers and ad campaigns. For example, the objective may be
improving brand awareness, increasing visits to the advertiser's webpage, or boosting sales. See, e.g., "How to
choose the right ad objective in Meta Ads Manager," *Meta Business Help Center*, available at
https://www.facebook.com/business/help/1438417719786914 (last accessed July 25, 2024) ("As your business
grows, your campaign goals may change. First, you may want to focus on building awareness and acquiring new
customers. Later, you may want to encourage people to make a purchase or sign up for an event. Consider what are
the most crucial actions that your potential customers can take in order for you to achieve your current goals.").
[84] ██

48.   Advertiser evaluations are also aided by numerous freely available web articles targeted towards small- and medium-sized businesses.[85] These resources detail the process of tracking and optimizing performance metrics to improve digital ad campaigns.[86]

49.   Moreover, there is evidence that advertisers not only monitor return metrics, but also use them to learn and optimize their strategies over time. [87] ███████████████

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[85] See, e.g., "How do you know if your marketing campaigns are successful?," *Hotjar*, May 11, 2023, available at https://www.hotjar.com/blog/marketing-campaign-success/ (last accessed July 25, 2024) (suggestions include tracking metrics such as *page traffic*, *leads generated*, *click-through-rate*, *sales*, *return on investment*, *customer retention*, and *brand sentiment*); Tanton, Abbi, "Mastering Campaign Measurement: A Guide for B2B Marketers," *Demand Science*, April 2, 2024, available at https://demandscience.com/resources/blog/ways-to-measure-campaign-success/ (last accessed July 25, 2024); Dougherty, Sean, "Ad campaign optimization: six strategies for success," *Funnel*, February 21, 2023, available at https://funnel.io/blog/six-ad-campaign-optimizations (last accessed July 25, 2024) (including strategies such as "Use A/B testing to determine which of your advertising assets get positive results. You'll likely find [ads'] popularity change over time."); Meyer, Elyse F., "Five Ways To Optimize Your Digital Marketing Strategy," *Forbes*, April 15, 2021, available at https://www.forbes.com/sites/forbesagencycouncil/2021/04/15/five-ways-to-optimize-your-digital-marketing-strategy/ (last accessed July 25, 2024).

[86] For example, see Ben-Meir, Kobi, "Five Key Marketing Metrics For Savvy Small- And Medium-Sized Business Owners," *Forbes*, April 19, 2023, available at https://www.forbes.com/sites/forbescommunicationscouncil/2023/04/19/five-key-marketing-metrics-for-savvy-smalland-medium-sized-business-owners/ (last accessed July 25, 2024); Nichols, Wes, "Advertising Analytics 2.0," *Harvard Business Review*, 2013, available at https://hbr.org/2013/03/advertising-analytics-20 (last accessed July 25, 2024) ("In our experience, these initiatives require five steps, which can be implemented even by small companies.… Fifth, test aggressively and feed the results back into the model. For instance, if your optimization analysis suggests that shifting some ad spending from TV to online display will boost sales, try a small, local experiment and use the results to refine your calculations.").

[87] ███
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Naylon, Jenna, "Media Planning and Buying Strategies: The Importance of Test & Learn," *MatrixPoint*, available at

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https://www.thematrixpoint.com/resources/articles/media-planning-and-buying-strategies-the-importance-of-test-learn (last accessed July 25, 2024) ("Applying a systematic approach to 'testing' (running controlled 'what ifs') varying aspects of media campaigns and 'learning' from the results to refine strategies, drive better results, and maximize marketing ROI. The core principle is to iterate and optimize based on data and insights gathered from continuous testing."); "How to Optimize Ad Campaigns: What You Need to Know," *TEC Direct Media*, available at https://tec-direct.com/how-to-optimize-ad-campaigns-what-you-need-to-know/ (last accessed on July 25, 2024) ("This cycle of testing, learning, and optimizing is fundamental to achieving long-term success in digital advertising."); "How can you optimize your digital ads?," *LinkedIn*, available at https://www.linkedin.com/advice/3/how-can-you-optimize-your-digital-ads-skills-advertising (last accessed July 26, 2024) ("Optimizing your digital ads is not a one-time process, but a continuous cycle of learning and improving.").

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52. ███████████████████████████

███████████████████████████████████████ The fact that ad buying tools probe auction dynamics is also reflected in internal Google emails and documents about ████ (which offers an ad buying tool).[97] For example, Google internal documents indicate that ████ conducted experiments and discovered the effects of DRS v2 experiments.[98] In another case, tests run by an advertiser using DV360 in Japan identified the effects of RPO.[99] ███████

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[98] Email from ████████ Google), "Re: ████ Dynamic Pricing on ████," February 12, 2016, GOOG-DOJ-15426012 at -016-018 (████ conducted experiments and discovered the effect of DRS v2 experiments). Google's internal email thread discusses whether the effect discovered was from RPO or DRS. See *ibid* (email from ████ ████ stating that "Our team has found data suggesting that there is dynamic pricing on ████. It looks like dynamic pricing starts from ████."); *id*. at -017 (email from ████ (Google) stating "Essentially it looks like they've discovered reserve price optimization feature and are asking questions" and another Google employee noting "I do believe this is DRS v2"); see GOOG-DOJ-29803801 at -809 ("████ has only observed DRS v2 in experiment but have hinted at further data that may or may not include RPO.").

[99] GOOG-DOJ-05311280 at -281 (email on March 11, 2016, from ████ (Google), stating "One of DBM Japan's advertisers, ████, has noticed that their winning prices are all coming in just under their bid price (which is set at ████ across three campaigns). The expected win price is somewhere in the order of ████

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53.   Consistent with the industry evidence and the academic literature, there is also evidence
        that some Google employees believed that if advertisers and their bidding tools were faced
        with a change from second-price to first-price auctions, "most DSP's [sic] bidding
        algorithms would be able to adapt gracefully and that GDN could adapt as well, given a
        quarter or two of lead time."[101]

           b.   Advertisers Rely on Sophisticated Advertising Agencies

54.   The *second* factor that facilitates learning by advertisers is that advertisers can and often
        do rely on the services of sophisticated[102] advertising agencies[103] to provide expertise,

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yen, because the bid prices are so high (and their [sic] know it)."); *id.* at -287-288 (email on February 29, 2016, from
████████ (Google Marketing Team), explaining that the same advertiser conducted additional tests on DV360
and non-AdX inventory to isolate the effect to AdX and DV360: "One more thing; We are running the same research
with non-AdEx [sic] inventories via DBM now. However, it shows normal distributions of winning price and seems
to work as we expect. So, ███████████████████████████ see also GOOG-DOJ-29803801 at -801
and -810 ("Due to recent buyer observations it is possible reactive comms will be needed before the planned
announcements of the project" because "DBM researchers … working with █████████████████████
have noticed RPO effects using DBM tests. The results were shared with the ██████████████████████
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[101] GOOG-DOJ-13350192 at -197; see also GOOG-AT-MDL-018632411 at -421 (Google's internal presentation on
"First Price Auction & Unified Floors" stating "Since it will be a 1st price auction then Authorized Buyers are likely
to adjust their bids downwards over time"); Goke, et al. (2022).

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[103] FAC ¶¶ 73 and 198 concede that agencies are involved. Deposition testimony and advertiser documents also
demonstrates that advertisers commonly hire ad agencies. ███████████████████████████
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optimization tools, and return metrics to help them maximize return on ad spend.[104] These agencies help advertisers design ad campaigns,[105] manage their budgets,[106] develop the

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constraints and objectives provided to ad buying tools,[107] and assess returns.[108] These agencies integrate information on campaign performance, giving advertisers ready access to salient information.[109] When advertisers multi-home with different ad buying tools, agencies can and do provide comparative information about performance and recommendations about how to reallocate budgets,[110] which facilitates competition across ad buying tools.

55.   For example, ███████, Chief Innovation and Product Solution Officer at ███ (an ad agency that ███), testified that ███ ██.[111]

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[108] ███

[109] ███

[110] ███

[111] ███

56.   ███████, Senior Vice President and Managing Director at ██████ (another ad
agency), testified that ███████████████████████████████████.[112]

57.   ████████████, Chief Operating Officer at ████ (a global advertising agency),
testified that ██

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█████████████████,"[113]

58.   █████████, Head of Programmatic at ████ (a global marketing and advertising
agency), testified that ██████████████████████████████████

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59.   Similarly, █████████, Global Head of Product at ████, (an ad agency)[116] testified that

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60.   The ad agency ██████████ recommends that advertisers ████████████████████████

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61.   ███████████, a U.S.-based ███ manufacturer, uses the ad agency ██████ to optimize its ad campaigns. █████ produces reports for ████████████ of █████ ██ ████████.[119]

62.   ████████████████████████ hired ████████████ for a campaign in October 2020. █ ██ ██ ██ ██ ██ ██████████████████████████████.[120]

        c.   Competitive Pressure Incentivizes Ad Buying Tools to Continually Learn and Optimize Their Bidding Strategies

63.   The *third* important feature of this industry is that competitive pressure on ad buying tools, along with many advertisers' simultaneous use of multiple ad buying tools, incentivizes ad buying tools to continually learn and optimize their bidding strategies. Because many advertisers simultaneously use multiple ad buying tools and because those advertisers and advertising agencies closely monitor and compare returns of ad buying tools, if an ad buying tool is not bidding effectively, it will likely be out-competed by an alternative that offers advertisers lower costs and higher returns.[121] In this way, advertisers' (and their ad agencies') focus on performance creates competitive pressure on ad buying tools to optimize their strategies. These competitive pressures create strong incentives for ad buying tools to keep secret any innovative strategies or optimizations that they develop to

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help advertisers maximize their returns.[122]

64.   There is ample evidence that advertisers use multiple ad buying tools, a practice known as "multi-homing."[123] For example, research company ▮▮▮▮▮▮▮▮▮▮▮ found that, in the first half of 2022, about ▮ percent of surveyed advertisers anticipated using four or more DSPs, with an additional ▮ percent planning to use three, ▮ percent planning to use two, and only ▮ percent planning to use one DSP.[124] The prevalence of multi-homing means that advertisers can easily compare returns across ad buying tools, and shift advertising resources to the tools that perform best. Indeed, internal Google documents note that "[w]e also know that buyers are buying across all these companies simultaneously, and don't seem to care that much which one they ultimately buy on, as long as they're getting good ROI."[125] Multi-homing and the ability to compare returns across platforms mean that advertisers are well-positioned both to detect changes in returns and shift resources accordingly.[126]

65.   Testimony from industry participants affirms that advertisers and advertising agencies evaluate and compare the performance of different ad buying tools in deciding how and

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[122] Economics recognizes trade secrets as an important economic phenomenon. One study defines a trade secret as "an item of information … that has commercial value and that the firm possessing the information wants to conceal from its competitors in order to prevent them from duplicating it." Friedman, David D., William M. Landes, and Richard Posner, "Some Economics of Trade Secrets," *Journal of Economic Perspectives*, Vol. 5, No. 1, 1991, pp. 61-72 at 61. Scholars note that "Some of the best-known names among consumer products are based on intellectual property protected by trade secrecy," including Coca Cola and Kentucky Fried Chicken. See Cass, Ronald A. and Keith N. Hylton, "Trade Secrets," *Laws of Creation*, Harvard University Press, 2013, pp. 76-96 at 76. Another study argues that digital technology is one of the reasons why trade secrets have been increasingly important. See Almeling, David S., "Seven Reasons Why Trade Secrets are Increasingly Important," *Berkeley Technology Law Journal*, Vol. 27, No. 2, 2012, pp. 1091-1117.

[123] See Expert Report of Dr. Itamar Simonson, July 30, 2024, at ¶¶ 109-110 (survey results indicate that approximately 75% of higher-spend advertisers multi-home on ad buying tools for programmatic display ads); *id.* at ¶¶ 158-159 (survey results indicate that 80% of lower-spend advertisers multi-home on ad buying tools for display ads); *id.* at ¶¶ 205-206 (survey results indicate that approximately 73% of ad agencies multi-home on ad buying tools for programmatic display ads); see also *id.* at ¶ 18, Figure 4 (presenting survey results on multi-homing across different types of digital advertising and display ad buying tools).

[124] GOOG-AT-MDL-008928829 at -875. For additional evidence of multi-homing among ad buying tools, see, e.g.,
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[125] Email from Jonathan Bellack (Google), "Re: [drx-pm] Op-ed that RTB should move to first price auction – what do you think?," August 6, 2015, GOOG-DOJ-13350192.

[126] ▮▮

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where to allocate their advertising dollars. For example, ███████, Director of ██

████████████ at ███, testified that ████████████████████████

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66.   Similarly, ████████, Senior Vice President of ██████████████████ at

████, testified that ██████████████████████████████████████

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67.   ████████, Product Manager at ██████████████, █████████████████

██████████ testified that ████████████████████████████████

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69. The competitive pressure that advertiser monitoring and learning places on ad buying
tools incentivizes those tools to learn and adapt to industry changes. The tools that adapt
most effectively are rewarded with more customers. This fact is reflected in a Google
email discussing the potential move to a first-price auction: "It's tempting to assume that
many of the [] [DSPs] are not smart/rational enough, so they won't adapt [their bidding
strategy] and therefore the value can be captured for the seller. But, what matters is not
how smart they are now. Since DSPs ultimately compete against each other for advertiser
dollars, those that don't adapt their strategies will obviously have higher cost for the same

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value delivered to their customers, so they will shrink to irrelevance, and the demand that

matters will have adapted."[137]

        d.   Frequency and Amount of Feedback Facilitates Learning

70.   The *fourth* important feature of this industry that facilitates learning is that advertisers and

the advertising agencies and ad buying tools they use all receive continuous and

meaningful amounts of feedback over relatively short periods of time.[138] This enables

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[137] Email from Nemo Semret (Google), "Re. [drx-pm] Op-ed that RTB should move to first price auction – what do
you think?," August 5, 2015, GOOG-DOJ-13350192 at -195-196.

[138] Advertisers on Google Ads (formerly, AdWords) received campaign-level data on metrics such as impressions,
views, traffic, clicks, cost, click-through-rate, and conversions as early as 2013. See "AdWords for video makes
reporting more insightful, purposeful and beautiful," *Google*, January 30, 2013, available at
https://adwords.googleblog.com/2013/01/ (last accessed July 25, 2024). Currently, both Google Ads and DV360
report performance on several metrics (conversions, click-through-rate, CPM, clicks, average cost-per-click) to aid
advertisers' decision-making. See "Use auction insights to compare performance," *Google Ads Help*, available at
https://support.google.com/google-ads/answer/2579754 (last accessed July 25, 2024); "Measure results," *Google Ads
Help*, available at https://support.google.com/google-ads/topic/3119141 (last accessed July 25, 2024); "Metrics in
reports," *Google Display & Video 360 Help*, available at https://support.google.com/displayvideo/table/3187025 (last
accessed July 25, 2024). Google's analytics tools also provide significant feedback (on metrics such as user
acquisition, traffic acquisition, conversions, purchase activity etc.) to both small- and large-business advertisers on
their campaign performance. See "Google Marketing Platform," *Google*, available at
https://marketingplatform.google.com/about/ (last accessed July 25, 2024). Moreover, when Google transitioned its
ad exchange to a first-price auction, Google started providing bidders with data on the minimum bid to win
("MBTW"), which is the minimum value that the bidder would have needed to bid to win the auction. Google did so
because "[b]idding in first price auctions is fundamentally harder than bidding into second price auctions," GOOG-
DOJ-00216457 at -465, and the provision of MBTW data aids buyers in "train[ing] [their] per-query bidding models"
for future auctions. "Ad Manager Data Transfer reports," *Google Ad Manager Help*, available at
https://support.google.com/admanager/answer/1733124 (last accessed on July 25, 2024) (providing a detailed listing
of the "non-aggregated, event-level data from [advertisers'] ad campaigns" that Google provides to bidders).

Other platforms also provide data on several metrics for advertisers to measure performance across campaigns and
creatives. See, e.g., "Advertiser analytics," *Microsoft Xandr Platform*, March 5, 2024, available at
https://learn.microsoft.com/en-us/xandr/digital-platform-api/advertiser-analytics (last accessed July 25, 2024)
(providing information on metrics such as impressions, CPM, cost-per-click, conversion rate, video completion rate,
cost per video completion etc.); "How to use Audience performance report," *Criteo*, available at
https://help.criteo.com/kb/guide/en/audience-performance-report-9sG6Wef3qz/Steps/775752,1863384 (last accessed
July 25, 2024) (providing information on metrics such as exposed users, visits, displays, clicks, sales, revenue, and
cost-per-view). Several third-party tools also allow advertisers (including small advertisers) to monitor and optimize
campaigns, run A/B tests, and manages budgets. See, e.g., "Take your PPC automation to the next level," *Adalysis*,
available at https://adalysis.com/features/ (last accessed July 25, 2024); "PPC Reporting Capabilities," *Optmyzer*,
available at https://www.optmyzr.com/solutions/reporting (last accessed July 25, 2024). Advertisers also testified that

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advertisers (and their agencies) to continuously evaluate the feedback they receive with respect to the various return metrics.[139] As the academic literature notes, such experience and feedback facilitate learning in auction settings, as well as more generally.[140]

    e.   Ability to Run Experiments Facilitates Learning

71.   The *fifth* important feature of this industry that facilitates learning is the ability to run experiments. Such experiments are "generally considered to be the gold standard for drawing inference on causal effects."[141] In a recent book on the role of experiments in business, Harvard Business School professors Michael Luca and Max Bazerman stated that "perhaps no sector has embraced the experimental method more than the tech sector, where it is now a standard component of managerial decision making."[142]

72.   Advertisers can experimentally change the maximum they are willing to pay for a click or an impression, as well as other campaign parameters, to determine whether such changes

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[139] [redacted]

[140] The conventional literature on learning in auctions indicates that experience increases with the number of auctions in which a participant bids. See Wang Xin and Ye Hu, "The Effect of Experience on Internet Auction Bidding Dynamics," *Marketing Letters*, Vol. 20, No. 3, 2009, pp. 245–261; Goke, et al. (2022); Pownall, Rachel A.J. and Leonard Walk, "Bidding Behavior and Experience in Internet Auctions," *European Economic Review*, Vol. 61, No. 1, 2013, pp. 14-27. More generally, greater feedback speeds learning. See Wieland, Volker, "Learning by Doing and the Value of Optimal Experimentation," *Journal of Economic Dynamics and Control*, Vol. 24, 2000, pp. 501-534; Bandiera, Oriana, Valentino Larcinese, and Imran Rasul, "Blissful ignorance? A natural experiment on the effect of feedback on students' performance," *Labour Economics*, Vol. 34, 2015, pp. 13-25; Benkard, Lanier C., "Learning and Forgetting: The Dynamics of Aircraft Production," *American Economic Review*, Vol. 90, No. 4, 2000, pp. 1034-1054; Darr, Eric D., Linda Argote and Dennis Epple, "The Acquisition, Transfer, and Depreciation of Knowledge in Service Organizations: Productivity in franchises," *Management Science*, Vol. 41, No. 11, 1995, pp. 1750-1762.

[141] Mattei, Alessandra, Fabrizia Mealli, and Anahita Nodehi, "Design Analysis of Experiments," in Klaus Zimmerman, *Handbook of Labor*, *Human Resources and Population Economics*, Springer, 2022, pp. 1-4 ("Randomized experiments are generally considered to be the gold standard for drawing inference on causal effects; carefully designed and executed randomized experiments guarantee that, in expectation, there are no systematic differences between those units who were exposed to the treatment and those who were not, and thus simple comparisons of treatment and control units have a causal interpretation.").

[142] See Luca, Michael and Max H. Bazerman, *The Power of Experiments: Decision Making in a Data-Driven World*, Cambridge: MIT Press, 2021, at 62 ("But perhaps no sector has embraced the experimental method more than the tech sector, where it is now a standard component of managerial decision making.").

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help them better achieve campaign objectives. For example, ████████████████
conducted ███
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73.   Amy Corner, Vice President for ██████████████████████ at ██████████████,
testified that ██
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74.   David Williams, Associate Managing Director at Utah Office of Tourism testified to
running several kinds of experiments, including A/B tests, before launching a campaign to
evaluate what does and does not work.[146]

75.   Similarly, █████████ at ████ testified that █████████████████████
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77.   The net impact of these five features of the Ad Tech industry is that advertisers need not understand the various bidding strategies that are implemented on their behalf, nor how the precise dynamics of any auction impact the effectiveness of the strategies of ad buying tools. Rather, advertisers can monitor and test their tools' performance with regard to various return metrics and shift their advertising budgets in pursuit of the highest returns available.

78.   There is, moreover, considerable evidence that many advertisers do *not* focus on auction dynamics or on the particular strategies used by ad buying tools to bid into auctions. For example, the Communications Director at ████████████████████████ ████████ who purchases digital advertisements for the agency's advertising campaigns, testified that ██████████████████████████████████ ████████████.[154]

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79.　████████ of the ████████████████████████████████████

testified that ██

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80.　████████, VP for Strategic Communications at ████████████████, testified

that ██

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81.　While ████████████, Associate Managing Director at ████████████████,

testified that ██

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82.   ██████ , Public Information Officer at ████████ , testified that ████████████

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████ [161] ██

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3. Publisher Learning

83.   Many of the same features that impact advertiser behavior have parallel impacts on
publishers. As with advertisers, these factors facilitate learning and have direct
implications for understanding the impact of Google's alleged deception. These factors
include: (a) publishers' focus on the revenue generated by impressions, and their ability to
continually learn and adapt to maximize their returns; (b) publishers' reliance on the
services of companies providing sophisticated optimization tools to help them optimize
their returns; (c) publishers' common use of multiple exchanges to create competition for
their business and increase their returns; and (d) the continuous and voluminous feedback
publishers receive over short periods of time, which enhances learning and optimization.

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As with advertisers, the net impact of these factors is that publishers need not attempt to master every aspect of the auctions in which they participate or perfectly understand the strategies in which intermediaries engage on their behalf.

    a.   Publishers Use Various Measures of Return to Learn and Adapt

84.   The *first* important feature is that publishers, like advertisers, focus on various measures of return and continually use those measures to learn and adapt.[163] Publishers focus on measures including, but not limited to, revenue per impression, revenue per visit, and revenue per click.[164] Publishers' focus on returns is reflected in an exchange between █████████████████ and Google, which begins with "[w]e've noted a sharp decline in ████████ performance starting from late last month."[165] Summarizing the ███████████████████████████████ it continues "[w]e note a much larger decline in ██
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██████████████████ [166] A similar focus on returns is reflected in an internal document at ████████ comparing impressions sold, revenue generated ██████████████ ████████████████████████████ s ██████████████ ███████████████ [167] ████████ publisher team also continuously monitors ████████████████████████████████████ ██████████████ . [168]

85.   There is evidence that publishers use these measures to assess and compare the effectiveness of different strategies. ████████████████████████ ██ ██ ██ ██ ██ ██ ██ ████████████████████████████

b.   Publishers Rely on Sophisticated Intermediaries

86.   The *second* factor that facilitates learning and adaptation by publishers is that ad servers and other intermediaries provide sophisticated tools that help publishers optimize their returns. For example, it is common for intermediaries to offer dynamic floor pricing to

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improve the performance of publisher inventory.[173] ██████ ad exchange uses ██████

██████████ and has done so since as early as ████.[174] █████[175] and █████[176] also use

██████████████, as does █████ ad server.[177] Google itself offered Reserve Price

Optimization to help publishers set price floors that generated better returns.[178] When one

publisher was losing auctions due to high price floors, Google reached out proactively to

suggest that the publisher use Google's automated tool for optimizing price floors or that

it test alternative price floors itself using Google's manual experiments tool.[179]

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[173] See Picard, Eric, "Publishers, Don't Settle for Below-Floor Pricing," *AdExchanger*, November 1, 2023, available at https://www.adexchanger.com/the-sell-sider/publishers-dont-settle-for-below-floor-pricing/ (last accessed July 25, 2024) ("Supply-side platforms (SSPs) were born to protect publishers' interests in an automated auction environment. They introduced features like dynamic floor pricing to ensure that demand-side platforms (DSPs) pass on their best bids into the auction.").

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[178] GOOG-DOJ-04937154 at -155 ("Optimized pricing in the Open Auction automates the post-auction analysis and floor price updates that publishers are already doing and takes it a step further.… Open auctions tend to have a large price gap between what a buyer bids, and what they pay. As result, publishers have created complex systems of publisher-set floors to close the gap. Unfortunately, these floors are hard to calculate manually, requiring ad ops teams to spend countless hours gathering data and running post-auction analysis to update pricing and priorities in their system. Some publishers have even resorted to more extreme methods like waterfalls between exchanges, which introduces latency that damages consumer experience and advertiser performance. And even with all this effort, there is still a wide and persistent price gap between the bid and closing prices in the open auction across all our publishers. We think there is a better way. Optimized pricing effectively reduces the gap between the first price and closing price increasing publisher yield.").

[179] After UPR was introduced, Google's representative noticed a publisher client losing auctions due to high floor prices. The representative made suggestions on how the publisher could adjust the bid floor and increase its revenue.
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87.   Other companies also offer solutions that help publishers maximize revenue from ads. For

example, ███████████ offers technological solutions for ███████████

███.[180] Maxifier offers

several solutions to increase publishers' CPM and revenue, including prediction of

campaign performance, optimization based on performance metrics, simulation and testing

of changes in campaigns before implementation, and automation of optimization

processes.[181] MonetizeMore offers AdX optimization, AdSense optimization, custom

revenue stream recommendations, and reconciliation of discrepancies between publisher's

and partner's impression counts.[182] Inventale offers forecasting of ad inventory,[183]

monitoring of campaign performance,[184] and optimized yield management.[185] Clickio

offers price floor optimization and automated mediation between bids to "guarantee

maximum revenues."[186] Adomik offers publishers that it can "collect and organize

revenue data from ad servers, ad exchanges, and header bidding partners," and also

"delivers aggregated visibility and insights into their monetization for [p]ublishers to

increase their yield."[187]

88.   In addition, ███████████████ produces newsletters with market-wide analysis that

can help publishers decide whether and how to shift inventory across ad exchanges. For

example, "███

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[180] ███████████████ "Make every use worth more," *Verve Group*, available at
https://verve.com/publishers/ (last accessed July 25, 2024). "Fill rate is a key performance indicator (KPI) in digital
advertising that measures the percentage of ad requests successfully filled with ads. It represents the efficiency with
which publishers utilize their ad inventory, helping advertisers and publishers assess the effectiveness of their
advertising campaigns and inventory management. In simpler terms, fill rate quantifies how well a publisher is able to
match the available ad inventory with relevant ads from advertisers. A higher fill rate generally indicates better ad
inventory utilization and a more effective advertising strategy," "What is Fill Rate? Definition, Types, &
Calculations," *AdQuick*, available at https://www.adquick.com/adtech/fill-rate (last accessed July 25, 2024).

[181] "Maxifier for Publishers," *Maxifier*, available at https://maxifier.com/maxifier-for-publishers/ (last accessed July
25, 2024).

[182] "Your site is unique. Your ad optimization should be too," *MonetizeMore*, available at
https://www.monetizemore.com/# (last accessed July 25, 2024).

[183] "Forecasting," *Inventale*, available at https://inventale.com/en/forecasting/ (last accessed July 26, 2024).

[184] "Monitoring," *Inventale*, available at https://inventale.com/en/monitoring/ (last accessed July 25, 2024).

[185] "Yield Management," *Inventale*, available at https://inventale.com/en/yield-management/ (last accessed July 25,
2024).

[186] See "Maximize Revenue, Minimize Hassle," *Clickio*, available at https://clickio.com/monetization/ (last accessed
July 25, 2024) (offering "Price Floor Optimization" and "Google AdSense Mediation").

[187] "Smart Advertising Analytics: To turn insights into revenue," *Adomik*, available at https://www.adomik.com/ (last
accessed July 25, 2024) (emphasis omitted).

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        c.   Publishers Multi-Home

89.   The *third* factor that facilitates learning and adaptation by publishers is that they often use multiple ad exchanges to sell their inventory. In 2020, ███████████████ reported that "publishers use ██ SSPs and plan to ██████ in 2021," and even ██████████████ ███████████ reported using an average of ███ SSPs.[189] Plaintiffs themselves recognize that publishers compare returns and performance of the multiple ad exchanges they use, and that such comparisons and multi-homing enable publishers to shift inventory among exchanges accordingly to maximize returns.[190]

90.   For example, █████████, Head of Advertising at █████████ (a magazine and digital media publisher) testified that ███ ██

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[188] ██ ██████

[189] GOOG-AT-MDL-004170032 at -037. The importance of publisher multi-homing was an element that the DOJ highlighted in its investigation of Google's acquisition of Admeld: "[t]he investigation determined that web publishers often rely on multiple display advertising platforms and can move business among them in response to changes in price or the quality of ad placements. This use of multiple display advertising platforms, commonly called 'multi-homing,' lessens the risk that the market will tip to a single dominant platform." "Statement of the Department of Justice's Antitrust Division on Its Decision to Close Its Investigation of Google Inc.'s Acquisition of Admeld Inc.," *Department of Justice*, December 2, 2011, available at https://www.justice.gov/opa/pr/statement-department-justices-antitrust-division-its-decision-close-its-investigation-google (last accessed July 25, 2024).

[190] ██ ██ ██ ██ ███

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91.   Other publishers, ██████ and █████████, regularly ████████████████████

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92.   █████████████ works with multiple ad exchanges that programmatically sell its ad

inventory. █████████████ Vice President of Revenue Operations & Analytics at ██

█████████████ testified that ███████████████████████████

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93.   Similarly, ███████ ████████████████████████████████████
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      d.   Frequency and Amount of Feedback Facilitates Learning

94.   The *fourth* factor that facilitates learning by publishers is the high volume of feedback that
publishers receive over time. [199] For example, publishers in aggregate sell over ████████

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[199] Publishers on AdX have received ad unit level data as on metrics such as minimum CPM, and auction price as early as 2012. See "PubTalk: PCH's Denise Leggio on winning big with DoubleClick Ad Exchange," *DoubleClick Publisher Blog*, April 24, 2012, available at https://doubleclick-publishers.googleblog.com/2012/04/ (last accessed July 25, 2024) ("From reporting features at the individual ad unit level, to the Minimum CPM Recommendation tool to set the minimum auction price, AdX has provided Denise's team many tools to optimize revenue. 'The optimization options have been extremely valuable for our online business. The tools, reports and data provided give us insight into our inventory and buyer habits,' she says. 'With those insights, we're able to make changes extremely quickly.'"); ██
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impressions per month.[200] This enables publishers to obtain a continuous view of their returns, as well as quick feedback in response to changes or experiments they implement.[201] ███████████████████████████████

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████████████████████[202] Google's guide for publishers during the introduction of UPR recommended "testing and optimizing" as a means of setting an optimal price floor, and encouraged publishers "to run a manual experiment on an existing UPR with a fixed or Target CPM. To get the most reliable results, we would recommend running A/B experiments on at least 50% of traffic for a minimum of two weeks."[203]

95.   As with advertisers, the net impact of these factors is that publishers need not attempt to master the details of auction dynamics or the bidding strategies used by ad buying tools. Instead, consistent with basic economic theory, a Google email aptly describes publisher behavior: "[a]t the end of the day pubs care about yield, they don't care the slightest about auction dynamics."[204]

██████████   See "Ad Manager report metrics," *Google Ad Manager Help*, available at https://support.google.com/admanager/table/7568664 (last accessed July 25, 2024). Furthermore, publishers routinely use services of third-party companies. See, e.g., "Maxifier for Publishers," *Maxifier*, available at https://maxifier.com/maxifier-for-publishers/ (last accessed July 25, 2024); "Are you leaving Ad Revenue on the table?" *MonetizeMore*, available at https://www.monetizemore.com/# (last accessed July 25, 2024); "Forecasting," *Inventale*, available at https://inventale.com/en/forecasting/ (last accessed July 26, 2024); "Monitoring," *Inventale*, available at https://inventale.com/en/monitoring/ (last accessed July 25, 2024); "Yield Management," *Inventale*, available at https://inventale.com/en/yield-management/ (last accessed July 25, 2024); "Price Floor Optimization" and "Google AdSense Mediation," *Clickio*, available at https://clickio.com/monetization/ (last accessed July 25, 2024); "Smart Advertising Analytics: To turn insights into revenue," *Adomik*, available at https://www.adomik.com/ (last accessed July 25, 2024).

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[201] For example, note that "Real Time Bidding has pushed publisher ad ops teams to develop increasingly complex strategies to segment and price inventory. [Publisher] Ad Ops teams have typically run post-auction analysis to inform updates to floor prices across all their inventory and to set prices for all their demand partners." GOOG-TEX-00585243 at -244.

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[203] ██████████████████████████

[204] Email from Drew Bradstock (Google), August 5, 2015, "Re: [drx-pm] Op-ed that RIB should move to first price auction -- what do you think?," GOOG-DOJ-13350192 at -198.

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III. Mr. Andrien Fails to Follow His Own Framework and Proposes Vastly Overstated DTPA Civil Penalties

96.   I begin this section by briefly reviewing the plaintiffs' DTPA claims that Mr. Andrien discusses in his report. I then describe Mr. Andrien's framework for determining what he considers to be appropriate DTPA civil penalties.[205] I also describe how Mr. Andrien does not even attempt to apply his own framework, which requires a calculation of the benefits Google received from the alleged deception, but instead implements an entirely ad hoc set of calculations. I conclude this section with a brief discussion of how Mr. Andrien's calculations vastly overstate any penalties that could result from the application of his framework.

A. Overview of the Alleged Deception

97.   Mr. Andrien proposes DTPA civil penalties for Google's alleged deception about Reserve Price Optimization (RPO), Dynamic Revenue Sharing (DRS), and Project Bernanke "and their various iterations"[206] and for publicly "represent[ing] that it ran a transparent auction where all bidders on Google's ad exchange competed on equal footing."[207] I briefly introduce each of those claims here and provide detailed analyses of each in Sections IV-VII of this report.

98.   With regard to RPO, DRS, and Bernanke, the plaintiff States assert that "Google failed to properly disclose these programs (or disclose them at all) and misled publishers and advertisers about their existence and effects."[208] Mr. Andrien claims that "starting at least as early as 2010 and running through September 2019, Google represented to both publishers and advertisers that AdX was operated as a second-price auction. . . . However, through various Google programs implemented starting in at least 2013, I understand that Google manipulated the auction process such that AdX auctions could no longer be characterized as they were represented, including through RPO, DRS, and Project Bernanke and their various iterations."[209]

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[205] Andrien Report at ¶ 106.

[206] Andrien Report at ¶ 29.

[207] Andrien Report at ¶ 51.

[208] FAC ¶ 526.

[209] Andrien Report at ¶ 29.

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99.   RPO employed information about bidders' past bids to establish floor prices in subsequent
auctions. Its purpose was to help publishers increase their revenue and encourage them to
make more high-quality inventory available.[210] According to Mr. Andrien, Google
concealed RPO from both advertisers and publishers until its announcement of the
program in May 2016.[211] He asserts that this concealment led to an increase in the average
clearing price in AdX auctions to the detriment of advertisers.[212] He also asserts that
Google's alleged concealment of RPO "prevented publishers from effectively optimizing
revenue," and "might [cause publishers to] set suboptimal reserves on any impression for
which RPO may have been active."[213]

100.   DRS dynamically changed the AdX revenue share on an auction-by-auction basis to
permit more AdX auctions to clear.[214] Another one of plaintiffs' experts, Professor
Matthew Weinberg, asserts that second-price auctions lead bidders to bid amounts equal to
their true values,[215] and Mr. Andrien asserts that AdX auctions to which the first two
versions of DRS (known as "DRS v1" and "DRS v2") applied were not "true" second

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[210] See GOOG-DOJ-04937154 at -155 and 159 (explaining that Optimized Pricing, the external name for RPO, uses historic bids to set floor prices in order to "reduce[] the gap between the first price and closing price increasing publisher yield" and "could encourage publishers to make more inventory accessible to the open auction.").

[211] Andrien Report at ¶¶ 31-32 ("Google did not announce this [RPO] program to its customers prior to its launch. In fact, Google did not announce the program until May 12, 2016, over a year after its initial rollout, which it announced in a blog post under the name "optimized pricing.").

[212] Andrien Report at ¶ 35 ("Google also impacted advertiser behavior through its second-price auction representation and concealment of RPO. Namely, I understand that Google's representation that it was running a second-price auction encouraged advertisers to bid their true value for impressions, which over time caused later AdX reserve prices to increase, which, in turn, led to a payoff loss for advertisers by decreasing win rates and increasing the average clearing price in later AdX auctions.") In support of this claim, Mr. Andrien relies on Professor Weinberg, who claims, *inter alia*, that "if the advertiser were aware of RPO, they would have shaded their bid." *Ibid.* (citing Weinberg Report at ¶ 285).

[213] Andrien Report at ¶ 34.

[214] See, e.g., GOOG-DOJ-15130321 at -321 (explaining that "DRS is an optimization feature that increases publisher and Google revenue by dynamically changing the AdX sell-side revenue share so that more auctions end with a winning buyer. V1 decreased Google's revenue share to grow revenue overall. V2 adjusts Google's revenue share more aggressively, by decreasing and increasing the Google share on different impressions, to increase the number of AdX auctions with a winning buyer while always achieving the publisher's contracted revenue share (typically ▇%) or higher for each billing period."); GOOG-DOJ-04937543 at -543 (explaining that the second version of DRS "decreas[ed] and increas[ed] the Google share on different impressions, to increase the number of AdX auctions with a winning buyer," with the goal of maintaining Google's AdX average revenue share across all transactions).

[215] See Weinberg Report at ¶ 47 ("A sealed bid single-item auction is truthful if each bidder receives the best possible outcome (given the other bidders' bids) by submitting a bid equal to their own value"); *id.* at ¶ 47 ("Second-price auctions are truthful, and this is one of their key advantages in comparison to first-price auctions.").

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price auctions.[216] Mr. Andrien further contends that Google's failure to disclose DRS was deceptive because "by leading advertisers to believe the AdX auction was a standard second-price auction, advertisers would engage in suboptimal behavior,"[217] including continuing to bid as they would in true second-price auctions instead of shading (i.e., lowering) their bids.[218] Mr. Andrien also claims that, "but for Google's omissions, publishers who believed that AdX ran a standard second price auction would have set different reserve prices if they had been aware of DRSv1" and that "[t]he same is true for DRS v2."[219]

101. Mr. Andrien contends that Project Bernanke modified the two bids that Google Ads submitted into the AdX auction by (i) increasing Google Ads' high bid to win more impressions, and (ii) decreasing (or removing) Google Ads' low bid.[220] The reduction or removal of the low bid reduced the AdX clearing price for impressions when Google Ads' high and low bids were the top two bids.[221] Mr. Andrien contends that Google's failure to disclose Bernanke was deceptive because, had it been disclosed, publishers likely would have raised their reserve prices and advertisers likely would have shaded their bids.[222] Instead, he asserts that "advertisers thought they were participating in a true second price auction"[223] and bid their "true values."[224]

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[216] See Andrien Report at ¶ 38 ("I … understand that with DRSv1, AdX did not run a true second price auction"); *id.* at ¶¶ 41-42 ("I understand that by not revealing DRSv1 and leading advertisers to believe the AdX auction was a standard second-price auction, advertisers would engage in suboptimal behavior. For example, if advertisers had known of DRSv1, they could shade their bids to get a higher return. The same is true of DRSv2."). Mr. Andrien refers to Professor Weinberg's expert report as his basis for reaching these conclusions. See Andrien Report at ¶¶ 38, 41-42.

[217] Andrien Report at ¶ 41.

[218] See Andrien Report at ¶¶ 41-42 ("I understand that by not revealing DRSv1 and leading advertisers to believe the AdX auction was a standard second-price auction, advertisers would engage in suboptimal behavior. For example, if advertisers had known of DRSv1, they could shade their bids to get a higher return. The same is true of DRSv2.").

[219] Andrien Report at ¶ 41.

[220] Andrien Report at ¶ 44.

[221] GOOG-DOJ-13469175 at -175 ("As part of Project Bernanke, we reduce the second bid (and in some cases drop the second bid completely) and create a pool of money, which we then reinvest by increasing the first bid on queries in order to win potentially unmatched queries. This is done in such a way that GDN profit is maximized while also ensuring fair GDN payout to the exchange/ publisher. Here, fairness is defined as ensuring the desired margin [typically 14%] on the GDN payout.").

[222] Andrien Report at ¶ 46.

[223] Andrien Report at ¶ 46.

[224] Andrien Report at ¶ 46.

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102.   Mr. Andrien also argues for DTPA civil penalties in connection with what he calls
        Google's "Equal Footing" misrepresentation.[225] According to Mr. Andrien, in 2019,
        Google "publicly represented that it ran a transparent auction where all bidders on
        Google's ad exchange competed on equal footing."[226] He further claims that
        representation was deceptive because Alchemist (a successor to Bernanke) gave
        advantages to Google Ads and because Facebook also received advantages under its
        Network Bidding Agreement (NBA) with Google.[227]

B.   Mr. Andrien's Framework for Determining DTPA Civil Penalties

103.   Mr. Andrien lays out the following framework for determining civil penalties. "To deter
        Google from continuing its misconduct, the penalty must eliminate Google's financial
        incentive to engage in the misconduct. At minimum, this would involve penalizing Google
        for the total incremental benefits (including future benefits) from the alleged
        misconduct."[228] He later repeats that idea, asserting that, "[f]rom a financial and economic
        perspective, to deter future violations, the total penalty must eliminate Google's financial
        incentive to engage in the alleged misconduct.... One way to frame the appropriate amount
        to deter future bad behavior is to consider an approach that penalizes Google *for at least
        the benefits it gained associated with the alleged misconduct*."[229] In this report, I refer to
        the "approach that penalizes Google for at least the benefits it gained associated with the
        alleged misconduct" as Mr. Andrien's "framework."

104.   Mr. Andrien develops his framework by identifying two types of direct benefits that
        Google might receive from its alleged misconduct. First, he contends that "Google directly
        benefits from its misconduct every time an auction clears on AdX that would not have
        cleared but-for the misconduct."[230] Second, he asserts that Google benefits "if the clearing
        price was higher than it would have been absent the misconduct."[231] Economists describe

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[225] Andrien Report at ¶¶ 51-54 (referring to alleged "equal footing" offenses); *id.* at ¶ 99 (referring to "Equal Footing/AdX Fairness").

[226] Andrien Report at ¶ 51.

[227] Andrien Report at ¶¶ 51-54; see also *id.* ¶ 47 (discussing Alchemist).

[228] Andrien Report at ¶ 11(f).

[229] Andrien Report at ¶ 106 (emphasis added).

[230] Andrien Report at ¶ 110.

[231] Andrien Report at ¶ 110.

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the first type of effect as a "quantity effect" and the second type of effect as a "price effect."[232] In this case, a quantity effect would correspond to an increase in Google's profits resulting from an increase in the number of impressions transacted on AdX as a result of the alleged deception. A price effect would correspond to an increase in Google's profits resulting from higher prices for impressions transacted on AdX due to the alleged deception. In either case, these changes must be linked to the alleged deception (rather than to the program itself).

C. Mr. Andrien Ignores His Own Framework in Calculating DTPA Civil Penalties

105. Mr. Andrien does not follow his own framework for calculating civil penalties. While he acknowledges that, "[i]deally, Google's benefits from the alleged misconduct should be measured as the incremental benefits it obtained by engaging in the misconduct," [233] he asserts that he was "unable to determine Google's total incremental benefits from the misconduct because Google has not produced information sufficient to determine even the direct benefits from the alleged misconduct, much less the indirect benefits from the alleged misconduct."[234] I show in Section VII that, despite Mr. Andrien's claim, one can in fact use the information produced in this case to assess and quantify Google's incremental benefits from the alleged deception.

106. Rather than follow his own framework, Mr. Andrien arrives at what he asserts to be an "appropriate" penalty by multiplying two inputs, neither of which he calculated in a way that is consistent with the principles he lays out or with any other methodology grounded in economics.[235] The first input is the number of transactions he contends were "affected"

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[232] For discussions of the concepts of "quantity effects" (also referred to by economists as "output effects") and "price effects" in other contexts, see, e.g., Mankiw. N. Gregory, Kneebone, Ronald D., and McKenzie, Kenneth J., *Principles of Microeconomics*, 10th Canadian ed. 2017) at 331, 376; Hutchinson, Emma, Principles of Microeconomics, OpenStax CNX, May 18, 2016, at Topic 4.2, available at https://ecampusontario.pressbooks.pub/uvicmicroeconomics/ (last accessed July 25, 2024) ("When you increase price, you increase revenue on units sold (The Price Effect). When you increase price, you sell fewer units (The Quantity Effect).").

[233] Andrien Report at ¶116.

[234] Andrien Report at ¶ 11(f)(ii); see also *id.* at ¶¶ 117-118 ("[T]o date, Google has not produced information relevant and necessary to quantify the direct benefits, much less the indirect benefits from the alleged misconduct."); *id.* at ¶ 110 footnote 285 ("I find these limited documents unreliable and insufficient to support an analysis of the direct benefit of the misconduct to Google.").

[235] Andrien Report at ¶ 76 ("I have been asked to opine on issues related to determining the appropriate amount of the civil penalty in each state.").

by Google's alleged deception.[236] Mr. Andrien does not show that these allegedly "affected" transactions resulted in any gains to Google, but instead simply assumes all transactions were "affected," apparently based on instructions from plaintiffs' counsel.[237] In Section IV, I detail how Mr. Andrien greatly inflated the number of "affected" transactions in numerous ways, including by counting very large numbers of transactions outside the U.S. and transactions that were not actually affected by the alleged deception.

107.   The second input into Mr. Andrien's penalty calculation is his asserted per-violation penalty range of ███████████████ for each "affected" transaction.[239] Mr. Andrien does not put forth any methodology supporting his conclusion that his proposed range is "appropriate," and he does not ground the range in either economics or his own framework. Mr. Andrien's only explanation for his proposed range of per-violation penalties is that they are "reasonable and appropriate" based on "information available . . . as of today" and his "education, training and experience."[240] Section V discusses in detail why Mr. Andrien's range of per-violation penalties is greatly inflated relative to his own framework.

D.   Mr. Andrien Wrongly Bases His Proposed DTPA Civil Penalties on Measures of Revenue Rather Than Incremental Profitability

108.   By multiplying his inflated number of "affected" transactions by his inflated and arbitrary per-violation range of penalties, Mr. Andrien calculates the following civil penalties for the alleged DTPA violations:

- RPO: between $2.06 and $6.16 billion
- DRS: between $1.18 and $3.53 billion
- Bernanke: between $7.27 and $21.81 billion

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[236] Andrien Report at ¶ 98 ("I have assumed that Google's misconduct indirectly affected all Open Auctions within the assumed period associated with each misconduct.").

[237] Andrien Report at ¶ 98 footnote 267 ("I have been asked to assume based on Professor Weinberg's report that all auctions during the period in which RPO, DRS v1, DRS v2 and Bernanke misconducts were active were affected by the claimed misconduct whether they were directly affected by the misconduct or not.").

[238] See Andrien Report at Section IV.H.

[239] Andrien Report at ¶¶ 11(h) and 128.

[240] Andrien Report at ¶ 128 ("Based on the information available to me as of today, the analysis presented in this report, as well as my education, training and experience, I conclude that it would be reasonable and appropriate for the trier of fact to assess a penalty in the range of ███████████████ for each violation.").

- Equal Footing on AdX: between $4.75 and $14.24 billion; and
- **Total Penalties**: between $7.27 and $21.81 billion.[241]

109.   Mr. Andrien claims that he is "unable to determine Google's financial benefit absent the misconduct, and therefore, cannot determine the incremental benefit to it from engaging in the misconduct."[242] Instead, "in lieu of an incremental benefits analysis," he "consider[s] two alternative quantitative measures – Google's display advertising profit and their display advertising revenue" which he contends "provide an indication of the aggregate benefit Google has derived during the period in which it engaged in the [alleged] misconduct."[243] Without explanation, he then dismisses profitability as "an inadequate and inappropriate proxy for the overall benefit, both direct and indirect, that Google has gained from the misconduct" and focuses instead on "Google's display advertising revenue allocable to the plaintiff States."[244] Confirming his focus on revenues, Mr. Andrien asserts that he calculates that Google's gross revenues from its "display advertising segment" during the 2013-2023 period by "isolat[ing] the revenue . . . associated with the display advertising products at issue in this matter" from Google's gross revenues from its DVAA (Display, Video, Apps, and Analytics) business.[245] He calculates that Google's display advertising gross revenue from the plaintiff States ███████████ and concludes that an appropriate total DTPA civil penalty would be up to $21.81 billion.[247]

110.   Even though he calculates that Google's display advertising business generated ███
███ of gross revenues[248] and proposes DTPA penalties up to $21.81 billion, Mr.

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[241] Andrien Report at ¶ 11(h), ¶ 127 and Table 4.

[242] Andrien Report at ¶ 118.

[243] Andrien Report at ¶ 118.

[244] Andrien Report at ¶ 123.

[245] Andrien Report at ¶ 92 ("To determine the revenue and profits related to Google's display advertising segment, I rely on internal 'DVAA' profit and loss statements ("P&Ls") as produced by Google. . . . In order to isolate the revenue and profit associated with the display advertising products at issue in this matter, I only include revenue and profits from the P&Ls related to AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads, which I understand are the products at issue in this matter."). Professor Skinner explains that "Mr. Andrien's estimates of booked revenue and operating profit for 2020–2022, reported in Exhibit 2 of his report, would change if I limit his analyses to the at-issue DVAA products, i.e., to Google Ad Manager, Google Ads, and DV360." See Expert Report of Douglas Skinner, July 30, 2024 ("Skinner Report"), at ¶ 50.

[246] See Andrien Report at ¶ 95 and Table 1.

[247] See Andrien Report at ¶ 127 and Table 4, ¶ 130.

[248] See Andrien Report at ¶ 95 and Table 1; see also id. at ¶ 119.

Andrien does not articulate a methodology to connect those two amounts. He also makes numerous errors in calculating those amounts, causing them both to be greatly exaggerated.

111.   Mr. Andrien's proposed $21.81 billion penalty is grossly inflated because he uses greatly exaggerated transaction counts and multiplies these by an overstated ███████████ ██████ penalty. The most significant cause of Mr. Andrien's gross inflation of transaction counts, which I discuss further in Section IV below, is his inclusion of worldwide AdX transactions rather than limiting his counts to U.S. transactions. I show below that limiting transactions to those involving U.S. users (but not accounting for other errors discussed in Section IV) reduces total transaction counts from ████████████ ██████████████████████████[249] Adjusting Mr. Andrien's proposed penalty amount for this one error reduces his upper range penalty estimate from $21.81 billion to $4.1 billion.[250]

112.   Mr. Andrien's calculation of $████████ in display advertising gross revenue is also greatly exaggerated because it includes revenues attributable to products that plaintiffs do not allege are at issue in this case, including AdMob, AdSense for Content, and Campaign Manager.[251] Based on the data provided in Mr. Andrien's backup materials, I estimate that these three products were responsible for about ██ percent of Google's display advertising gross revenues in 2022.[252]

113.   Furthermore, Mr. Andrien's display advertising gross revenue figure includes DV360's revenues resulting from transactions on third-party exchanges which are not at issue and

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[249] Calculations based on workpaper "DTPA Transaction Count Tables.xlsx". Additional calculations pertaining to transaction counts or estimates in this section are also based on the same workpaper.

[250] The reduced penalty of $4.1 billion is calculated as ████████ transactions times Mr. Andrien's upper per-unit penalty of $█████.

[251] Andrien Report at ¶ 92 ("To determine the revenue and profits related to Google's display advertising segment, I rely on internal "DVAA" profit and loss statements ("P&Ls") as produced by Google. . . . In order to isolate the revenue and profit associated with the display advertising products at issue in this matter, I only include revenue and profits from the P&Ls related to AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads, which I understand are the products at issue in this matter."). Professor Skinner explains that ("Mr. Andrien's estimates of booked revenue and operating profit for 2020–2022, reported in Exhibit 2 of his report, would change if I limit his analyses to the at-issue DVAA products, i.e., to Google Ad Manager, Google Ads, and DV360." Skinner Report at ¶ 50.

[252] Calculations based on Andrien Report Exhibit 2 and Andrien backup materials. See workpaper "AdMob, AdSense, CM Share of Google Display Advertising (Andrien Exhibit 2).xlsx".

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which Mr. Andrien excludes from his count of violations.[253] Using data produced by Google in this case, I estimate that over the 2013-2023 period about ▮ percent of DV360 ad spend on U.S. Open Auction transactions occurred on third-party exchanges.[254] Similarly, Mr. Andrien's display advertising gross revenue figure includes Google Ads' revenues resulting from transactions on third-party exchanges. Using data produced by Google in this case, I estimate that over the 2013-2023 period about ▮ percent of Google Ads' ad spend on U.S. Open Auction transactions occurred on third-party exchanges.[255]

114.   Holding these fundamental errors aside, Google's gross revenues are not a proper basis for calculating the benefits to Google from the alleged deception. First, Mr. Andrien admits that Google pays ▮ percent of its gross revenues to publishers as Traffic Acquisition Costs (TAC).[256] Any attempt to calculate benefits to Google should, at minimum, deduct TAC from gross revenues because Google does not retain any benefit from that portion of its gross revenues – it passes all of it along to publishers.

115.   Second, even net revenues ▮▮▮▮▮▮▮▮▮▮ are not an appropriate measure of how much Google benefits from its allegedly deceptive conduct. Economists focus on profits as the correct measure of benefits to a firm because revenues do not take into account that revenue generation requires the expenditure of costs. Indeed, economists generally assume that firms maximize profits because profits measure the net benefit created by a firm for its owners.[257]

116.   Mr. Andrien calculates that Google's display advertising business earned ▮▮▮▮▮ in

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[253] Mr. Andrien's starting dataset is Google's AdX data, and he only uses Open Auction transactions on Google's AdX in his analysis. See Mr. Andrien's backup codes ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮."

[254] These calculations are based on DV360 data through March 2023 and are described in Appendix H. See workpaper "DV360 and GA Share of Spend on 3PE."

[255] The percentage of Google Ads' ad spend going to third-party exchanges has ▮▮▮▮ from about ▮ percent in 2015 to about ▮ percent in 2017 and to about ▮ percent in 2022. These calculations are based on Google Ads data described in Appendix H. See workpaper "DV360 and GA Share of Spend on 3PE."

[256] Andrien Report at ¶ 120. ("One Google document shows that in 2018 TAC was estimated to account for ▮% of display gross revenue and notes that 'margin structure is ▮▮▮▮▮▮▮▮.'"). See also Andrien Report at Exhibit 2.

[257] See, e.g., Mankiw, N. Gregory, *Macroeconomics*, Worth Publishers, 7th ed. 2009, at 50-51 ("The goal of the firm is to maximize profit. Profit is equal to revenue minus costs; it is what the owners of the firm keep after paying for the costs of production.").

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operating profit associated with the plaintiff States between 2013 and 2023,[258] but that

amount is not an appropriate measure of Google's gains from the alleged DTPA

violations. Like Google's display advertising gross revenues, Google's display advertising

operating profits include results for products unrelated to the claims in this case,[259] and

from transactions achieved by Google's ad buying tools via third-party exchanges. After

correcting these errors, I estimated the operating profit generated by Google's display

advertising business between January 2013 and December 2023 from Open Auction

transactions in the plaintiff States ████████████.[260]

117.   Even more fundamentally, using Mr. Andrien's measure ██████████████████

████████████████████ in display advertising operating profits as a benchmark

for DTPA civil penalties would overstate the relevant measure under Mr. Andrien's

framework. According to Mr. Andrien, penalties should be limited to the *incremental*

benefits Google received *from the alleged deception.*[261] Mr. Andrien does not claim that

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[258] Andrien Report at ¶ 95 and Table 1. Operating profit is an accounting measure of profit, defined as "the total income a company generates from sales after paying off all operating expenses, such as rent, employee payroll, equipment and inventory costs. The operating profit figure excludes gains or losses from interest, taxes and investments." See "What is Operating Profit? Everything You Need to Know," *American Express*, May 22, 2024, available at https://www.americanexpress.com/en-gb/business/trends-and-insights/articles/what-is-operating-profit/ (last accessed July 27, 2024).

[259] Mr. Andrien drew Google's display advertising gross revenue and operating profit data from Google's DVAA profit and loss ("P&L") statements. He asserts that "[t]o determine the revenue and profits related to Google's display advertising segment, I rely on internal "DVAA" profit and loss statements ("P&Ls") as produced by Google. . . . In order to isolate the revenue and profit associated with the display advertising products at issue in this matter, I only include revenue and profits from the P&Ls related to AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads, which I understand are the products at issue in this matter." Andrien Report at ¶ 92. Consequently, the DVAA P&L statements relied upon by Mr. Andrien reflect the financial performance of not only the Google products at issue in this matter – Google Ad Manager, Google Ads, and DV360 – but also of AdMob, AdSense for Content, and CM360 (otherwise known as Campaign Manager). Professor Skinner explains that "Mr. Andrien's estimates of booked revenue and operating profit for 2020–2022, reported in Exhibit 2 of his report, would change if I limit his analyses to the at-issue DVAA products, i.e., to Google Ad Manager, Google Ads, and DV360." Skinner Report at ¶ 50.

[260] Calculations available in workpaper "Profit from Open Auction Transactions.xlsx." In calculating the ████ figure, I allocated operating profit for the U.S to plaintiff States using Mr. Andrien's methodology (described further in Section IV.D), which is based on their share of internet subscribers. I also allocated operating profits based on the billing address of advertisers, which reduced my estimate of the operating profit generated by Google's display advertising business between January 2013 and December 2023 from Open Auction transactions in the plaintiff States ████████.

[261] Andrien Report at ¶ 11(f) ("To deter Google from continuing its misconduct, the penalty must eliminate Google's financial incentive to engage in the misconduct. At minimum, this would involve penalizing Google for the total incremental benefits (including future benefits) from the alleged misconduct."); *id.* at ¶ 106 ("From a financial and economic perspective, to deter future violations, the total penalty must eliminate Google's financial incentive to

all of Google's display advertising operating profits (or revenues) arose as a result of the alleged deception, and it is implausible that the alleged deception would account for all of those profits (or revenues). In Section VII, I calculate how much incremental profit Google generated from the alleged deception and find that it is indeed only a small fraction ███████████ in total display advertising operating profits calculated by Mr. Andrien.

IV. Mr. Andrien Inflates Transaction Counts Due to Numerous Errors

118.   As noted in Section III, the first critical misstep in Mr. Andrien's ad hoc penalty analysis concerns his assumption regarding the number of transactions allegedly "affected" by Google's misconduct. In response to an apparent instruction from plaintiffs' counsel, he simply and incorrectly assumes that all Open Auction[262] transactions were affected.[263] As discussed below, there are numerous errors that inflate Mr. Andrien's count of "affected" transactions. Correcting for those errors (individually and in combination) results in a much smaller number of affected transactions.[264]

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engage in the alleged misconduct.… One way to frame the appropriate amount to deter future bad behavior is to consider an approach that penalizes Google for at least the benefits it gained associated with the alleged misconduct.").

[262] Mr. Andrien creates the data for his calculations in programs ███████████████████████████████

[263] See Andrien Report at ¶ 98 (indicating that he "assumed that Google's misconduct indirectly affected all Open Auctions within the assumed period associated with each misconduct"); *id.* at ¶ 98 footnote 267 (indicating that Mr. Andrien had "been asked to assume based on Professor Weinberg's report that all auctions during the period in which RPO, DRSv1, DRSv2, and Bernanke misconducts were active were affected by the claimed misconduct, whether they were directly targeted by the misconduct or not."). Mr. Andrien fails to account for the fact that, under plaintiffs' theory, the alleged deception would have affected incentives for only certain auction participants. Below, I carefully determine which auctions would have been affected (under plaintiffs' theory) and find that many auctions would not have been affected.

[264] Mr. Andrien does not provide a justification of why a count of matched queries is the correct measure of transactions. A possible alternative would be to count viewed impressions as transactions. Basing transaction counts on viewed impressions would reduce those counts by about ███████, relative to counts based on matched queries (for sources and calculations, see workpaper ██████████████████ Another possible alternative would be to base the number of transaction counts on the number of advertisers and/or publishers affected by the alleged deception, rather than the number of affected transactions. Between November 2013 (the date when Bernanke was introduced) and October 2021 (the date when the allegations in this case were largely unsealed, revealing the alleged deception, see Second Amended Complaint, *In re Google Digital Advertising Litig.*, 1:21-md-03010-PKC (S.D.N.Y. Oct. 22, 2021), ECF No. 152), I estimate that ██████ advertisers and ████ publishers participated in AdX Open Auction transactions involving U.S. users during that period. See workpaper "DTPA Transaction Count Tables.xlsx." Despite these alternatives, I adopt Mr. Andrien's approach of using matched queries to count alleged violations,

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119.   Table 1 summarizes my analysis of Mr. Andrien's errors in counting the number of

transactions affected by Google's alleged deception. The table focuses on total counts of

"de-duplicated" alleged violations, across all programs considered in Mr. Andrien's

analysis. De-duplication adopts Mr. Andrien's approach of counting each transaction at

most one time (even when potentially affected by multiple alleged deceptions).[265] The first

row of Table 1 shows that Mr. Andrien claims that ▮▮▮▮▮▮ transactions were

impacted by the alleged deception.[266] The remaining rows show the effect on transaction

counts of correcting each of Mr. Andrien's errors, either one at a time (columns 1 and 2)

or cumulatively (i.e., sequentially adding the impact of more corrections, shown in

columns 3 and 4). I discuss below how each of Mr. Andrien's errors inflates his count of

the total number of affected transactions.[267] Table C1 in Appendix C reports the number of

affected transactions separately for each program.

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without accepting that is the correct starting place.

[265] See Andrien Report at ¶ 127 and Table 4. This approach means that if a transaction was "affected" by two or more
programs, it would be counted a single time for the purpose of computing total civil penalties. See *id*. at ¶ 101
("While I provide a violation count of Open Auctions associated with each misconduct in this table, each individual
auction should only be counted as one violation. For example, if the trier of fact finds that Google is liable for both
RPO and Bernanke, each auction that occurred during the period both misconducts were active should only be
counted once as a violation.").

[266] See Andrien Report at ¶¶ 98-101 and Table 2 (indicating ▮▮▮▮▮▮ alleged violations involving Bernanke,
which, because Mr. Andrien de-duplicates transactions, equals Mr. Andrien's total transaction count).

[267] Calculations described in this section regarding are based on workpaper "DTPA Transaction Count Tables.xlsx."

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Sources: Data for AdX, Google Ads, and DV360 (see Appendix H for Bates numbers); XPP Data (GOOG-AT-MDL-DATA-000559277 to GOOG-AT-MDL-DATA-000561030); Billing State Crosswalk Data (GOOG-AT-EDTX-DATA-001116101, GOOG-AT-EDTX-DATA-001116100, GOOG-AT-EDTX-DATA-001116099); Autobidding Data (GOOG-AT-DOJ-DATA-000011657 to GOOG-AT-DOJ-DATA-000012656).

A. Mr. Andrien Incorrectly Includes Transactions Associated with Users Outside of the United States

120.   Mr. Andrien states that his count of ▮▮▮▮▮▮▮ violations is limited to "web display

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transactions . . . involving U.S. users."[268] However, while the data he uses do allow for the isolation of transactions involving U.S. users, Mr. Andrien's counts are not limited to transactions involving U.S. users. Instead, he uses counts of worldwide transactions.[269]

121.   Correcting this error reduces Mr. Andrien's de-duplicated transaction count from ███ ███ to ████████, an ███ percent decrease.[270]

B. Mr. Andrien Incorrectly Includes In-App Transactions

122.   As noted above, Mr. Andrien explains that "[i]n order to count violations, I use data as provided by Google on 'web display transactions . . . involving U.S. users.'"[271]

123.   My review of Mr. Andrien's programming code reveals that, while the data he uses do allow for the exclusion of in-app transactions, he does not in fact exclude in-app transactions.[272] As a result, despite his stated method of counting only alleged violations for Open Auction web transactions, Mr. Andrien includes in-app transactions as well.

124.   Excluding in-app transactions further reduces Mr. Andrien's de-duplicated transaction count to ████████, an ███ percent cumulative reduction relative to his total count of ████████ transactions.[273]

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[268] Andrien Report at ¶ 97.

[269] Mr. Andrien creates the data for his calculations in programs ██████████████████
██
████████████████████████████ As a result, Mr. Andrien's analysis includes both transactions involving U.S. users and transactions involving users in other countries.

[270] ██
████████████████████████

[271] Andrien Report at ¶ 97; see also id. at ¶ 55 ("The Plaintiff States allege that Google engaged in unfair, false, deceptive, and misleading business practices related to their display advertising technology and changes it made to the auctions for web display ads during the period of at least 2013 to the present.").

[272] Mr. Andrien creates the data for his calculations in programs ██████████████████
██
████████████████████████ As a result, Mr. Andrien's analysis includes both web transactions and in-app transactions.

[273] ██
████████████████████████

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C. Mr. Andrien Incorrectly Includes States that Cannot Recover Civil Penalties for Business-to-Business Transactions

125.   Plaintiffs' claims and Mr. Andrien's data and analysis concern only business-to-business transactions between Google and its advertiser or publisher customers.[274] I understand that the deceptive trade practices acts of Arkansas, Idaho, Indiana, and Utah apply only to consumer transactions.[275] It follows that Mr. Andrien's transaction counts should not include transactions associated with those four states. Excluding those four states further reduces Mr. Andrien's de-duplicated transaction count to ████████, which represents an ██ percent cumulative reduction relative to his total count of ████████ transactions.[276]

D. Mr. Andrien Incorrectly Allocates Transaction Counts to Plaintiff States by Failing to Use Available Data About Advertiser Locations

126.   Mr. Andrien allocates his overall transaction counts to the 17 plaintiff States on the basis of internet-subscriber data drawn from the U.S. Census Bureau's American Community Survey. He begins by estimating the number of internet subscribers in all of the plaintiff States.[277] He next divides the number of internet subscribers in those states by the total number of internet subscribers in the U.S. as a whole and then multiplies that ratio (about 29 percent on average between 2013 and 2023) by his count of U.S. transactions to estimate a count of transactions associated with all of the plaintiff States.[278]

127.   Mr. Andrien apparently recognizes that a more accurate allocation method would use the

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[274] See, e.g., Andrien Report at ¶ 29 ("I understand that, starting at least as early as 2010 and running through September 2019, Google represented to both *publishers and advertisers* that AdX was operated as a second-price auction.… Further, I understand that Google made misrepresentations and concealed important information related to this conduct, even concealing some of these programs entirely, thus misleading and deceiving *auction participants* and causing them to behave differently than they would have but for Google's misconduct." (emphasis added)). See also FAC at ¶ 526 ("Google failed to properly disclose these programs (or disclose them at all) and misled publishers and advertisers about their existence and effects.").

[275] See Google LLC's Motion to Dismiss Pursuant to Rule 12(b)(6) at 25-26, *State of Texas, et al. v. Google LLC*, No. 4:20-cv-00957-SDJ (E.D. Tex. Feb. 8, 2024), ECF No. 224 ("Plaintiffs' allegations relate to transactions with publishers and advertisers, and not to consumer transactions. Arkansas, Idaho, Indiana, and Utah therefore fail to state claims under their DTPAs, and those claims should be dismissed.").

[276] ██

[277] Andrien Report at ¶ 94.

[278] Andrien Report at ¶ 94.

locations of advertisers and publishers (rather than internet subscriber statistics),[279] but he
fails to use the data on the billing state of advertisers and publishers that Google has
produced.[280]

128.   I use these data to estimate each U.S state's percentage of U.S. impressions,[281] based on
the billing address of advertisers and publishers.[282] I estimate that about ▆ percent of U.S.
transactions are associated with the plaintiff States based on the billing address of
advertisers.[283] Adjusting the number of U.S. transactions by ▆ percent (rather than Mr.
Andrien's ▆ percent) further reduces Mr. Andrien's de-duplicated count of transactions to
▆▆▆▆▆, a ▆▆▆▆▆ cumulative decrease relative to his total count of ▆▆▆
▆▆▆ transactions.[284]

E. Mr. Andrien Incorrectly Assumes that the Alleged Deception Persisted Longer Than It Did

129.   Mr. Andrien's counts assume that transactions were affected by the alleged deception until
May 2024.[285] But the conduct on which plaintiffs' deception claims are based was
disclosed before May 2024, and under their theory, the alleged deception could not have

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[279] Mr. Andrien states, "Based on Google's verified discovery responses, Google has not identified the state of
residence, organization or incorporation of any of its customers and has not otherwise produced, among other
relevant requested data, revenue and profit specific to the plaintiff States in this matter. Based on the information
currently available at this time, I have estimated the share of Google's display advertising revenue and profit
associated with the plaintiff States using the below described methodology." Andrien Report at ¶ 91.

[280] Although Mr. Andrien relies on Google's April 8, 2024 interrogatory responses, Google supplemented those
responses on May 3, 2024 to explain that "Google has identified ordinary-course sources of current information on
customer billing state … which can be mapped to customer identifiers in the above-mentioned datasets, and has
generated 'crosswalks' between these datasets and billing state sources." See Defendant Google LLC's Supplemental
Response to Plaintiffs' Second Set of Interrogatories, May 3, 2024, at 4; see also GOOG-AT-EDTX-DATA-
001116100; GOOG-AT-EDTX-DATA-001116099.

[281] Similar, but slightly smaller, state allocation shares result if I use gross revenue instead than impressions.
Calculations included in workpaper "Allocation_Shares.xlsx."

[282] Some advertisers and publishers are assigned to multiple billing states. In these situations, I use Mr. Andrien's
state internet subscriber estimates to allocate the relevant impressions to individual states. For example, the data may
indicate that an advertiser's billing states are New York, Texas, and Florida. I assign a share of the advertisers'
impressions to each state equal to the percentage of internet subscribers in that state (calculated as the number of
internet subscribers in that state divided by the total number of internet subscribers in all billing states associated with
the advertiser).

[283] ▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆

[285] See Andrien Report at ¶ 99 and Table 2.

affected transactions after the underlying conduct was disclosed.

a. Reserve Price Optimization

130.   To estimate the number of transactions affected by the alleged deception about RPO, Mr.
       Andrien counts transactions occurring between the months when RPO launched (April
       2015) and when Google introduced the unified first price auction (September 2019).[286]
       Mr. Andrien disregards that the alleged deception about RPO ended in May 2016, when
       Google publicly disclosed that it had introduced a program that "uses historical data to
       automate the post-auction analysis and updating of floor prices that publishers already do,
       and takes it a step further."[287] Implementing this correction—and counting only
       transactions from April 2015 to May 2016 as potentially impacted by the alleged
       deception about RPO—reduces the number of relevant transactions associated with the
       alleged RPO-related deception from ███████ to ███████, a reduction of ██
       percent.[288]

b. DRS v1

131.   Mr. Andrien and I assume that only transactions from August 2015 to November 2016[289]

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[286] See Andrien Report, at ¶ 127 and Table 4 (indicating that the RPO penalty period started on 3/31/2015 and ended
on 9/25/2019 and explaining that when "[the beginning of the penalty period] is after the first day of the month,
violation count starts on the first day of the following month; if [the end of the penalty period] is after the first day of
the month, violation count ends on the last day of the previous month"); see also Defendant Google LLC's First
Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, Responses to Interrogatory No. 6 at 12
(reporting that "Reserve Price Optimization launched on or about March 31, 2015. RPO v.2 subsequently launched
on or about October 5, 2015. Prior versions of RPO were disabled along with the Google Ad Manager switch to first-
price auctions in September-October 2019. In June 2022, Google launched a version of RPO designed for Ad
Manager's first-price auction, known as Optimized Pricing, on select web traffic, and it was extended to all web
traffic in January 2023.").

[287] See Bellack, Jonathan, "Smarter optimizations to support a healthier programmatic market," *Google Ad Manager
Blog*, May 12, 2016, available at https://blog.google/products/admanager/smarter-optimizations-to-suppor/ (last
accessed July 26, 2024); GOOG-AT-MDL-C-000015606 at -611.

[288] ██
██

[289] This range is conservative because Google disclosed DRS v1 on August 4, 2015, prior to the full launch of DRS
v1 on August 20, 2015. See GOOG-AT-MDL-C-000035251 at -251 (Google Help Center post with filename of
"web_152039_version_47_*2015-08-04*__11_33_52.pdf", explaining that "[t]he Ad Exchange auction closing price is
determined as the greater of the second-highest net bid in the Ad Exchange auction or the reserve price applied to that
impression. *In some cases, the auction may close at a price lower than the reserve price applied, due to auction
optimizations*. Sellers are paid the Ad Exchange closing price, *net of Google's revenue share*, but will receive, subject
to the terms governing their use of Ad Exchange, no less than the min CPM applied to the auction." (emphases

would potentially be affected by the alleged deception about DRS v1.[290]

c. *DRS v2*

132.   To estimate the number of transactions affected by the alleged deception about DRS v2, Mr. Andrien counts transactions occurring between the months when DRS v2 launched (December 2016) and when it was replaced by truthful DRS (July 2018).[291] Mr. Andrien disregards that, in June 2016 (i.e., roughly six months before it introduced DRS v2), Google publicly disclosed that it "may increase or decrease revenue share per query. If you'd prefer to apply your contracted revenue share on every query, use the new Ad Exchange UI Admin control to exclude all the sites you monetize through your account from revenue share-based optimizations."[292] As a result, there was no period of time during which transactions were impacted by any alleged deception related to DRS v2.[293]

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[290] Bidders were likely to detect DRS v1 even if it had not been disclosed. In particular, with DRS v1, a bidder submitting a bid in the "dynamic region" (i.e., between the publisher set price floor and the amount that an advertiser would need to bid to clear that price floor, after accounting for AdX's revenue share) would sometimes win an impression that, in absence of DRS v1, it could not win and it would pay its bid for such an impression. Therefore, detecting DRS does not require a high level of sophistication or monitoring: a bidder could simply observe that it was winning impressions that it should not have been able to win.

added)); Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, Responses to Interrogatory No. 6 ("Dynamic Revenue Share launched on or about August 20, 2015.").

[291] See Andrien Report Exhibit 5 (indicating that DRS v2 started on 12/1/2016 and ended on 7/17/2018 and explaining that when "[the beginning of the penalty period] is after the first day of the month, violation count starts on the first day of the following month; if [the end of the penalty period] is after the first day of the month, violation count ends on the last day of the previous month"); see also Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, Responses to Interrogatory No. 6, at 12 (indicating that "Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016. tDRS subsequently launched on or about July 17, 2018.").

[292] See "2016 releases archive: DoubleClick for Publishers and Ad Exchange Seller," *Google Ad Manager Help*, available at https://support.google.com/admanager/answer/7421657?sjid=10086602547051235141-NA#zippy=%2Cjune-change-history-update-safeframe-for-creative-types-deal-check-bid-filter-apply-per-query-revenue-share-optimization (last accessed July 25, 2024) (providing a Q2 2016 Ad Exchange release stating "New Ad Exchange control for applying per-query revenue share optimization"); GOOG-AT-MDL-C-000015769 at -779. See also Weinberg Report at ¶¶ 197 (explaining that "Google announced DRSv2 when it was launched," but arguing that "if the concept of debt was not clearly disclosed, the general description of DRS as per-query revenue share optimization is insufficient for advertisers to draw conclusions at the level I have drawn in my report."); Andrien Report at ¶ 39 ("Google announced DRSv2 (under a different name) when it was launched and allowed publishers to opt out of the program (if a publisher opted out, DRSv1 was turned off as well), but advertisers and ad buying tools could not.").

[293] See Table C1 in Appendix C.

d. Project Bernanke

133.   Mr. Andrien and I assume that only transactions occurring between the months when
Bernanke launched (November 2013) and when Alchemist replaced second-price
Bernanke (October 2019) would potentially be affected by the alleged deception about the
versions of Bernanke that were designed for second-price auctions.[294]

e. Alchemist

134.   To estimate the number of transactions affected by the alleged deception about Alchemist
(also known as first-price Bernanke), Mr. Andrien counts transactions occurring between
the first full month when Google ran a unified first price auction (October 2019) and May
2024.[295] In doing so, Mr. Andrien disregards that the complaint in this litigation was
largely unsealed in October 2021, and the unsealed complaint publicly revealed, that
"Bernanke effectively manipulates" an advertiser's bid "without [the advertiser's]
knowledge (or anyone's knowledge) before routing it to Google's exchange."[296]
Recognizing that disclosure and counting only transactions from October 2019 through

[294] See Andrien Report Exhibit 5 (indicating that "Second-Price Bernanke" started on 11/11/2013 and ended on
10/25/2019 and explaining that when "[the beginning of the penalty period] is after the first day of the month,
violation count starts on the first day of the following month; if [the end of the penalty period] is after the first day of
the month, violation count ends on the last day of the previous month"); see also Defendant Google LLC's First
Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, Responses to Interrogatory No. 6 at 12
("Project Bernanke launched on or about November 11, 2013. Subsequent versions of Bernanke include Global
Bernanke, which launched on or about August 12, 2015; Project Bell v.2, which launched on or about October 26,
2016; and a further version of Bernanke compatible with Ad Manager's first-price auction (sometimes known as
'Alchemist'), which launched no later than on or about October 25, 2019.").

[295] See Andrien Report Exhibit 5 (indicating that "First-Price Bernanke" started on 10/25/2019 and continued to the
"present" and explaining that when "[the beginning of the penalty period] is after the first day of the month, violation
count starts on the first day of the following month; if [the end of the penalty period] is after the first day of the
month, violation count ends on the last day of the previous month"); id. Exhibit 3 ("Auction counts are extended
through the end of May 2024 assuming that the count of auctions in each month for the period April 2023 to May
2024 is equal to the average count of auctions during the first three months of 2023."); see also Defendant Google
LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, Responses to
Interrogatory No. 6 at 12 (reporting a "further version of Bernanke compatible with Ad Manager's first-price auction
(sometimes known as 'Alchemist'), which launched no later than on or about October 25, 2019").

[296] See Second Amended Complaint ¶¶ 151-153, State of Texas, et al. v. Google LLC, No. 1:21-md-03010-PKC
(S.D.N.Y. Oct. 22, 2021), ECF No. 152. Bernanke was also discussed in a The Wall Street Journal article from April
2021 (Horwitz, Jeff and Keach Hagey, "Google's Secret 'Project Bernanke' Revealed in Texas Antitrust Case," The
Wall Street Journal, April 11, 2021, available at https://www.wsj.com/articles/googles-secret-project-bernanke-
revealed-in-texas-antitrust-case-11618097760 (last accessed July 25, 2024)) and in an Ad Exchanger article from
January 2022 (Schiff, Allison, "More Details Revealed On Project Bernanke And Jedi Blue In Newly Unsealed
Google Suit," AdExchanger, January 14, 2022, available at https://www.adexchanger.com/online-advertising/more-
details-revealed-on-project-bernanke-and-jedi-blue-in-newly-unsealed-google-suit/ (last accessed July 25, 2024)).

October 2021 as potentially impacted by the alleged deception about Alchemist reduces the number of potentially affected transactions from ███████ to ███████, a reduction of ██ percent.[297]

f. Equal Footing

135. To estimate the number of transactions affected by the alleged "Equal Footing" deception, Mr. Andrien counts transactions occurring between the month when Google announced that all bidders in the unified first price auction would be treated equally (November 2019) and May 2024.[298] In doing so, Mr. Andrien disregards that Alchemist and the Facebook Network Bidding Agreement (NBA) were publicly disclosed when the complaint for this litigation was largely unsealed in October 2021 and that industry participants were therefore on notice of both forms of Bernanke and the Facebook NBA as of that point in time.[299] Recognizing that disclosure and counting only transactions from October 2019 through October 2021 as potentially impacted by the alleged deception about Alchemist and the NBA reduces the number of potentially affected transactions ███████████

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[297] ██

[298] See Andrien Report at ¶ 99 ("For Equal Footing/AdX Fairness, I use November 20, 2019 as the starting date, which is the date of the earliest identified widespread representation by Google regarding auction participants competing equally, though as stated above, Google made such representations before that time."); *id.* Exhibit 4 (assuming that the equal footing violation is ongoing, listing "Period End" as "Present"); *id.* Exhibit 3 ("Auction counts are extended through the end of May 2024 assuming that the count of auctions in each month for the period April 2023 to May 2024 is equal to the average count of auctions during the first three months of 2023.").

[299] See Second Amended Complaint ¶¶ 151-153, 203-234, *In re Google Digital Advertising Litig.*, No. 1:21-md-03010-PKC (S.D.N.Y. Oct. 22, 2021), ECF No. 152. The NBA was also discussed in a The Wall Street Journal article from April 2021 (Horwitz, Jeff, and Keach Hagey, "Google's Secret 'Project Bernanke' Revealed in Texas Antitrust Case," *The Wall Street Journal*, April 11, 2021, available at https://www.wsj.com/articles/googles-secret-project-bernanke-revealed-in-texas-antitrust-case-11618097760 (last accessed July 25, 2024), and in an Ad Exchanger article from October 2021 reporting that "[t]he unsealed suit also contains more detail on Jedi Blue, the codename for Google's alleged agreement to charge Facebook lower fees and give Facebook information, speed and other advantages in header bidding auctions in exchange for Facebook's support of Open Bidding, Google's header bidding alternative." Schiff, Allison, "Dominance And Collusion: Inside The Unredacted Antitrust Lawsuit Against Google's Ad Tech Business," *AdExchanger*, October 25, 2021, available at https://www.adexchanger.com/platforms/dominance-and-collusion-inside-the-unredacted-antitrust-lawsuit-against-googles-ad-tech-business/ (last accessed July 25, 2024); see also Lyden, Carolyn, "Google allegedly creates ad monopoly with Facebook to favor its own exchange according to new, unredacted details from Project Jedi," *Search Engine Land*, October 25, 2021 available at https://searchengineland.com/google-allegedly-creates-ad-monopoly-with-facebook-to-favor-its-own-exchange-according-to-new-unredacted-details-from-project-jedi-375487 (last accessed July 25, 2024).

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███████████████████████████████ [300]

136. Accounting for all of the disclosures discussed above further reduces Mr. Andrien's de-
duplicated count of transactions to ████████, a ███ percent cumulative decrease
relative to his total count of ████████ transactions.[301]

F. Mr. Andrien Does Not Account for Statutes of Limitations

137. I understand that many of the plaintiff States' respective statutes of limitations define
intervals of time following disclosures during which DTPA violations can be alleged and
penalties claimed. Mr. Andrien's transaction counts do not take account of these statutes
of limitations.

138. Counsel for Google has provided me information on each plaintiff State's "critical date,"
which is the date corresponding to the number of years prior to the filing date of plaintiff
States' original complaint (December 16, 2020) that is equal to the length of that state's
statute of limitations for DTPA claims. If a program was disclosed before the critical date
applicable to a plaintiff State, I conclude that the state cannot recover DTPA civil
penalties for the alleged deception about that program (i.e., for the purpose of calculating
DTPA civil penalties for that state, the number of transactions affected by that alleged
deception is zero). Appendix E provides more details about how I account for statutes of
limitations in my analysis.

139. Google disclosed RPO in May 2016[302] and DRS in June 2016.[303] I understand that Florida,
Idaho, Nevada, Puerto Rico, and South Dakota cannot recover DTPA civil penalties if a
program was disclosed before December 16, 2016; that Missouri and South Carolina
cannot recover DTPA civil penalties if a program was disclosed before December 16,

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[300] ███
████████████████████████████████████

[301] ███
█████████████████████████

[302] See Bellack, Jonathan, "Smarter optimizations to support a healthier programmatic market," *Google Ad Manager Blog*, May 12, 2016, available at https://blog.google/products/admanager/smarter-optimizations-to-suppor/ (last accessed, July 26, 2024); GOOG-AT-MDL-C-000015606 at -611-612.

[303] See "2016 releases archive: DoubleClick for Publishers and Ad Exchange Seller," *Google Ad Manager Help*, June 13, 2016, available at https://support.google.com/admanager/answer/7421657?sjid=10086602547051235141-NA#zippy=%2Cjune-change-history-update-safeframe-for-creative-types-deal-check-bid-filter-apply-per-query-revenue-share-optimization. (last accessed July 25, 2024) (under the Q2 2016 Ad Exchange release stating "New Ad Exchange control for applying per-query revenue share optimization"); GOOG-AT-MDL-C-000015769.

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2017; and that Indiana, Kentucky, Montana, and North Dakota cannot recover DTPA civil penalties if a program was disclosed before December 16, 2018.[304] Because RPO and DRS were disclosed before all of these critical dates, I understand that the plaintiff States of Florida, Idaho, Indiana, Kentucky, Missouri, Montana, Nevada, North Dakota, Puerto Rico, South Carolina, and South Dakota cannot recover DTPA civil penalties for alleged deception concerning RPO and DRS. For this reason, applying these states' statutes of limitations would reduce the number of transactions potentially impacted by the alleged deception about RPO by ███ percent and the number of transactions potentially impacted by the alleged deception about DRS by ███████████.[305]

140. Because the alleged deception concerning Bernanke/Alchemist has the earliest start date (November 2013) and ended in October 2021 (i.e., before the statute of limitations expired for any plaintiff State), state statutes of limitations do not change my corrected version of Mr. Andrien's de-duplicated count of potentially impacted transactions by the alleged deception. I note, however, that if Google is not found liable for DTPA violations related to Bernanke/Alchemist, then the statutes of limitations would lead to a reduction in the de-duplicated number of transactions across the other allegedly deceptive programs.

G. Mr. Andrien Incorrectly Includes Unaffected Transactions

141. Mr. Andrien, at the apparent request of plaintiffs' counsel, assumes that all Open Auction transactions occurring during the penalty period for a program were "affected" by the alleged deception about that program.[306] Mr. Andrien makes no attempt to link these allegedly "affected" transactions to any gains to Google from the alleged deception.

142. Mr. Andrien includes in his transaction counts some transactions that *could not have been affected by the alleged deception*, even according to the theory laid out by Professor Weinberg, on whom Mr. Andrien relies. In this section, I estimate how many transactions

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[304] See Appendix E.

[305] ███

[306] Andrien Report at ¶ 98 ("I have assumed that Google's misconduct indirectly affected all Open Auctions within the assumed period associated with each misconduct."); *id.* at ¶ 98, footnote 267 ("I have been asked to assume based on Professor Weinberg's report that all auctions during the period in which RPO, DRSv1, DRSv2, and Bernanke misconducts were active were affected by the claimed misconduct, whether they were directly targeted by the misconduct or not.").

should have been excluded from Mr. Andrien's transaction counts because, under the
plaintiffs' theory, the alleged deception could not have affected (i) the clearing price, (ii)
the winning bidder, (iii) whether the transaction cleared on AdX, or (iv) AdX's revenue
share. These exclusions are conservative because neither Mr. Andrien nor Professor
Weinberg has provided any data or empirical evidence to identify any transactions that
would be affected by the alleged deception or to indicate that the remaining transactions
actually were affected by the alleged deception.[307]

143.   Excluding transactions that could not have been affected further reduces the total count of
transactions from ▮▮▮▮▮ to ▮▮▮▮▮, as shown in row 7 of Table 1. This represents
a ▮▮ percent reduction relative to the count of transactions remaining after accounting
for Mr. Andrien's other errors (described above).[308] When taken together with the
corrections described in the previous subsections, removing unaffected transactions
reduces Mr. Andrien's count of affected transactions from ▮▮▮▮▮ to ▮▮▮▮,
which is a ▮▮▮▮ cumulative reduction.[309]

144.   Below, I describe the details of how I estimate the number of transactions affected by the
alleged deception about each program.[310] The starting point for each calculation is the
transaction count after making the corrections described in the previous subsections (i.e.,
the counts in row 6 of Table C1 in Appendix C). That is the number that appears in Table
C2 in the first row for each program. Successive rows in Table C2 remove unaffected
transactions, and the second column of the table describes the reason for the exclusion.
The last row for each program reports the number of affected transactions.

a.   Reserve Price Optimization

145.   Mr. Andrien asserts that the alleged deception regarding RPO led to an increase in the

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[307] My exclusion of transactions that could not have been impacted by the alleged deception should not be interpreted
as a finding that the remaining transactions were impacted.

[308] ▮▮

[309] ▮▮

[310] See also Table C2 in Appendix C.

average clearing price in AdX auctions.[311] In doing so, Mr. Andrien relies on Professor Weinberg, who asserts that "if the advertiser were aware of RPO, they would have shaded their bid from the beginning."[312] Shading (i.e., lowering) bids could result in lower AdX clearing prices. Professor Weinberg also speculates that "if Google is good at optimizing reserves via RPO, a publisher may wish to lower the reserve it sets on AdX in order to give AdX greater flexibility in optimizing its reserve, which would lead to greater revenues for both AdX and the publisher."[313]

146.   However, even if one takes the plaintiffs' theory at face value, Mr. Andrien should have accounted for the fact that RPO did not apply to Google Ads.[314] Because Google Ads was exempt from RPO, there is no reason to believe—and neither Mr. Andrien nor Professor Weinberg provides any evidence, or even asserts—that advertisers using Google Ads would have bid differently absent the alleged deception. For that reason, there is also no reason to believe that publishers—who during this time could set price floors specific to Google Ads[315]—would have modified price floors for Google Ads if RPO had been disclosed.

147.   As a result, I exclude from the number of transactions potentially affected by the alleged deception about RPO (i) all AdX transactions for which a Google Ads bid set the clearing price (regardless of whether Google Ads or another bidder won); and (ii) all AdX transactions that Google Ads won and where a price floor set the clearing price.[316] These

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[311] Andrien Report at ¶ 35 ("Google also impacted advertiser behavior through its second-price auction representation and concealment of RPO. Namely, I understand that Google's representation that it was running a second-price auction encouraged advertisers to bid their true value for impressions, which over time caused later AdX reserve prices to increase, which, in turn, led to a payoff loss for advertisers by decreasing win rates and increasing the average clearing price in later AdX auctions.").

[312] Weinberg Report at ¶ 285.

[313] Weinberg Report at ¶ 279.

[314] See GOOG-DOJ-13212948 at -948 (naming "GDN" the "prime example" of a buyer exempted from RPO); GOOG-DOJ-13199603 at -603 ("We are exempting bidders (adx 'buyer networks') who submit a second bid to the AdX auction from [RPO] which will effectively make all of GDN demand exempt from [RPO]."). See also Declaration of ████████, May 2, 2024, GOOG-AT-MDL-C-000017971 ("May 2, 2024 ████ Declaration") at ¶ 6 ("RPO did not apply to buyers that submitted two bids into the second-price AdX auction.").

[315] GOOG-AT-MDL-000875073 at -083, showing that under "AdX Open Auction Pricing Rule", publishers could set "per-buyer floor."

[316] I estimate the number of such transactions based on a Google document reporting the percentage of revenue and queries won by either Google Ads or AdX Buyers (i.e., DV360 and Authorized Buyers), by determinant of the clearing price: GDN (Google Ads), "Other AdX Buyers", or floor prices. See Email from ████████ (Google),

exclusions reduce the number of transactions in which the outcome *could have* been
affected by the alleged deception about RPO from ███████ to ███████, which is a
reduction of ██ percent relative to the count after correcting Mr. Andrien's other errors.[317]
Overall, the full set of corrections cumulatively reduces Mr. Andrien's count of
transactions potentially impacted by the alleged RPO deception from ███████ to █
███████, a reduction of more than ██ percent.[318]

b. DRS v1

148.   As with RPO, Mr. Andrien relies on Professor Weinberg in asserting that auction
        outcomes would have been different but for the alleged deception regarding DRS v1.[319] In
        particular, Professor Weinberg asserts that advertisers would have shaded their bids had
        Google revealed DRS v1.[320]

149.   Again, however, even if one were to take this assertion at face value, one needs to account
        for the fact that DRS v1 did not apply to Google Ads.[321] Because Google Ads was exempt
        from DRS v1, there is no reason to expect—and neither Mr. Andrien nor Professor

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"Re: Second pricing mechanism," December 16, 2013, GOOG-DOJ-15719056 at -056. First, the document reports
that, post Bernanke implementation (which is the relevant period for an analysis related to RPO), when Google Ads
won, ██
██
██
██
██
██████████████████████████████████ If alternative documents providing the information I use in my calculations
become available, I plan to update my calculations accordingly.

[317] ██

[318] ██

[319] Andrien Report at ¶ 41.

[320] Weinberg Report at ¶ 228 ("By not revealing DRSv1 to the advertisers, Google made material gains. This is
because if advertisers were to shade their bids, which is the natural bidding behavior in a non-truthful auction like
DRSv1, this would lead to less revenue for both AdX and publishers. However, advertisers likely did not shade their
bids, since Google never publicly revealed DRSv1.").

[321] See GOOG-DOJ-15068390 at -391 ("This launch applies to AdX buyers (incl. DBM) on AdX sellers: [] AdWords
(GDN): N[o]").

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Weinberg provides evidence, or even asserts—that advertisers using Google Ads would have shaded their bids absent the alleged deception. Similarly, because Google Ads advertisers would not have changed their bidding strategies, there is no reason to believe publishers would have modified price floors for Google Ads bidders if DRS v1 had been disclosed.

150. As a result, I exclude from the number of transactions potentially affected by the alleged deception about DRS v1 (i) all AdX transactions where a Google Ads bid set the clearing price (regardless of whether Google Ads or another bidder won); and (ii) all transactions that Google Ads won where a price floor set the clearing price.[322] These exclusions reduce the number of potentially affected transactions from ████████ to ████████, which is a reduction of ██ percent relative to the count after correcting Mr. Andrien's other errors.[323] Overall, the full set of corrections reduces the number of transactions potentially impacted by the alleged deception about DRS v1 from the ████████ estimated by Mr. Andrien to ████████, which is a cumulative reduction of more than ██ percent.[324]

c. DRS v2

151. As explained in Section IV.E(c), Google disclosed DRS v2 before it was launched, so no transactions could have been impacted by any alleged deception related to DRS v2.[325]

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[322] As discussed above in connection with RPO, I estimate the number of such transactions based on a Google document reporting the percentage of revenue and queries won by either Google Ads or AdX Buyers (i.e., DV360 and Authorized Buyers), by determinant of the clearing price: GDN (Google Ads), "Other AdX Buyers", or floor prices. See Email from ████████ (Google), "Re: Second pricing mechanism," December 16, 2013, GOOG-DOJ-15719056 at -056.

[323] ██
██

[324] ██
██

[325] See "2016 releases archive: DoubleClick for Publishers and Ad Exchange Seller," *Google Ad Manager Help*, June 13, 2016, available at https://support.google.com/admanager/answer/7421657?sjid=10086602547051235141-NA#zippy=%2Cjune-change-history-update-safeframe-for-creative-types-deal-check-bid-filter-apply-per-query-revenue-share-optimization (last accessed July 25, 2024) (under the Q2 2016 Ad Exchange release stating "New Ad Exchange control for applying per-query revenue share optimization"); GOOG-AT-MDL-C-000015769. See also Weinberg Report at ¶¶ 197 and 131(c) (explaining that "Google announced DRSv2 when it was launched," but arguing that "if the concept of debt was not clearly disclosed, the general description of DRS as per-query revenue share optimization is insufficient for advertisers to draw conclusions at the level I have drawn in my report."); Andrien Report at ¶ 39 ("Google announced DRSv2 (under a different name) when it was launched and allowed publishers to opt out of the program (if a publisher opted out, DRSv1 was turned off as well), but advertisers and ad buying tools could not.").

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This is shown in Table C1 in Appendix C, which reports that the proper count of

transactions associated with the alleged deception about DRS v2 is zero.

152.   Table C4 in Appendix C reflects the alternative assumption that transactions potentially

could have been affected if they occurred between the months when DRS v2 launched

(December 2016) and when it ended (July 2018).[326] This period encompasses all

transactions that occurred while DRS v2 was in effect and thus reflects the most

conservative approach to estimating the period during which transactions potentially were

affected by DRS v2.[327] In this analysis, I further assume that the DRS v2 was not

disclosed until the complaint was largely unsealed in October 2021[328] (which results in no

plaintiff State's statute of limitations barring recovery for the alleged deception about

DRS v2).

153.   Under these alternative assumptions, I assess how many transactions could have been

impacted by the alleged deception about DRS v2, according to plaintiffs' theory. Mr.

Andrien relies on Professor Weinberg to explain how the nondisclosure of DRS v2 could

impact advertisers.[329] Professor Weinberg asserts that, if DRS v2 were fully disclosed, no

advertisers would have placed any bids into the so-called "dynamic region" (i.e., the

region where DRS v2 lowered AdX's revenue share).[330] Professor Weinberg's theory

indicates that the *only* transactions that could have been affected by the alleged deception

regarding DRS v2 are those where the winning bidder either submitted a bid in the

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[326] See Andrien Report, Exhibit 5 (indicating that DRS v2 started on 12/1/2016 and ended on 7/17/2018 and
explaining that when "[the beginning of the penalty period] is after the first day of the month, violation count starts
on the first day of the following month; if [the end of the penalty period] is after the first day of the month, violation
count ends on the last day of the previous month"); see also Defendant Google LLC's First Amended Responses and
Objections to Plaintiffs' Third Set of Interrogatories, Responses to Interrogatory No. 6 at 12 ("Dynamic Revenue
Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016. tDRS
subsequently launched on or about July 17, 2018.").

[327] For example, this analysis accounts for Professor Weinberg's suggestion that Google's disclosure of DRS v2 was
not sufficiently detailed. See Weinberg Report at ¶ 231(c) ("If the concept of debt was not clearly disclosed, the
general description of DRS as per-query revenue share optimization is insufficient for advertisers to draw conclusions
at the level I have drawn in my report…In order for advertisers to have sufficient information regarding DRSv2 in
order to avoid paying more than their value for an impression, Google would have needed to disclose a somewhat
precise description of the debt concept. I do not know whether Google indeed made such a disclosure, nor how it was
made, but in my opinion such information is vital to advertisers, even if they were already aware in a general sense
that DRSv2 optimizes revenue shares on a per-query basis.").

[328] Second Amended Complaint ¶ 150, *In re Google Digital Advertising Litig.*, No. 1:21-md-03010-PKC (S.D.N.Y.
Oct. 22, 2021), ECF No. 152.

[329] Andrien Report at ¶ 42.

[330] Weinberg Report at ¶ 226.

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"dynamic region" (where DRS v2 would lower AdX's revenue share) or the AdX revenue

share was increased so that AdX could recoup the lower revenue share on other

transactions.

154.   Because DRS v2 did not apply to Google Ads and DV360,[331] only the roughly ▮ percent

of transactions that were won by Authorized Buyers could have been impacted by the

alleged deception related to DRS v2.[332]

155.   To identify the fraction of Open Auction transactions won by Authorized Buyers who bid

in the dynamic region, I rely on a Google document reporting that ▮▮▮▮▮▮▮▮▮▮

▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

▮▮▮.[333] In addition, I assume that AdX increased the revenue share on a similar

percentage of transactions to maintain its 20 percent average revenue share. ▮▮▮

▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

156.   Table C4 shows that, under the alternative assumption that the penalties period for DRS

v2 runs from December 2016 to July 2018, removing unaffected transactions would

reduce the count of transactions potentially impacted by the alleged deception from ▮

▮▮▮ to ▮▮▮▮ , a reduction of ▮▮ percent.[334]

d. Project Bernanke

157.   Mr. Andrien asserts that publishers likely would have changed their reserve prices, and

that advertisers would have shaded their bids, if they had known about Bernanke.[335]

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[331] Google Ads was excluded from DRS v1 and v2, and starting in November 2016, DV360 was also excluded. See
Email from ▮▮▮▮▮▮ (Google), "Fwd: [Monetization-pm] [drx-pm] LAUNCHED! AdX Dynamic Revenue
Share (DRS)," September 11, 2015, GOOG-DOJ-15068390 at -391 ("This launch applies to AdX buyers (incl. DBM)
on AdX sellers" but not for AdWords (GDN) buyers); Email from ▮▮▮▮▮▮▮▮ "[Launch 145022] Dynamic
Revshare v2 on Ad Exchange for AdX Buyers," March 10, 2016, GOOG-DOJ-14717283 at -283 ("The scope of this
launch is limited to AdX buyers."); Email from ▮▮▮▮▮▮▮▮ "OVERDUE LAUNCH – Please update:
[Launch 169646] Remove DBM from AdX dynamic revshare," November 9, 2016, GOOG-DOJ-14734878 at -878
("DBM [now DV360] does not plan to participate dynamic revshare v2.").

[332] Calculations reported in workpaper "DTPA DRSv2.xlsx".

[333] See GOOG-AT-MDL-007375273 at -273 (in which the reference in this document to "RTB buyers" should be
interpreted as both Authorized Buyers and DV360).

[334] ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

[335] Andrien Report at ¶ 46.

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However, Bernanke applied only to Google Ads.[336] As a result, had Bernanke been
disclosed, non-Google Ads bidders (i.e., DV360 and Authorized Buyers) would not have
had an incentive to shade their bids. There is, therefore, no reason to believe that
transactions where the AdX clearing price was set by non-Google Ads bidders would have
been impacted by the alleged deception related to Bernanke. Similarly, because non-
Google Ads bidders would not have changed their bidding strategies, there is no reason to
believe publishers would have set different floors for those bidders if Bernanke had been
disclosed.

158.   Accounting for these facts, I reduce Mr. Andrien's count of transactions associated with
the alleged Bernanke-related deception by excluding: (i) transactions won by Google Ads
where non-Google Ads bidders set the clearing price; and (ii) transactions won by non-
Google Ads bidders where the clearing price was set by a non-Google Ads bidder or the
price floor.[337]

159.   In addition, I note that, between May 2016 and September 2019, a "truthful" version of
Bernanke applied to Google Ads advertisers who were using autobidding.[338] Because this
second version of Bernanke was "truthful," advertisers using autobidding would have had
no incentive to modify their bids if Bernanke had been disclosed. As a result, in addition
to the exclusions described above, I also exclude transactions occurring between May

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[336] Bernanke was a Google Ads program. See GOOG-DOJ-13469175 ("Project Bernanke involves reducing the
second price and increasing the first price of the two bids submitted by GDN to the AdX auction.").

[337] As in the case of RPO and DRS v1, I estimate the number of such transactions based on a Google document
reporting the percentage of revenue and queries won by either Google Ads or AdX Buyers (i.e., DV360 and
Authorized Buyers), by determinant of the clearing price: GDN (i.e., Google Ads), "Other AdX Buyers", or floor
prices. See Email from ███████████ (Google), "Re: Second pricing mechanism," December 16, 2013, GOOG-
DOJ-15719056 at -056.

[338] GOOG-DOJ-AT-02467209 at -209 (indicating that the "truthful" version of Bernanke would "charge the
minimum price needed to win the query. No change for non-CO ads.…We propose that for CO [Conversion
Optimizer] advertisers (tCPA, fixed CPA, ROAS) gTrade should charge the minimum price to win the query, which
makes the traffic look like regular second price auction").

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2016 and September 2019 that were won by Google Ads, DV360, or Authorized Buyers and where the clearing price was set by a Google Ads advertiser using autobidding.[339]

160.   The net result of these exclusions is to reduce the number of transactions potentially affected by the alleged deception about Bernanke to ███████. This represents a █ percent reduction from the █████████████ remaining after accounting for the Bernanke-related errors previously described,[340] and a ██ percent cumulative reduction from the ████████ transactions counted by Mr. Andrien.[341]

e.   Alchemist

161.   When Google transitioned to a unified first price auction in September 2019, Bernanke was updated and renamed "Alchemist."[342] Mr. Andrien counts all transactions from October 2019 to May 2024 as impacted by alleged deception concerning Alchemist.[343]

162.   However, neither Mr. Andrien nor Professor Weinberg has articulated a theory for how the alleged *deception* regarding Alchemist impacts auction participants. Similarly, neither Mr. Andrien nor Professor Weinberg has articulated a theory for how Alchemist was inconsistent with Google's so-called "equal footing" representations. In particular, neither Mr. Andrien nor Professor Weinberg has asserted or provided evidence that AdX treats

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[339] The percentage of Google Ads revenue where the advertiser used autobidding is estimated using data produced by Google. See GOOG-AT-DOJ-DATA-000011657 to GOOG-AT-DOJ-DATA-000012656; see also May 3, 2024 Letter from D. Pearl to W. Noss and Z. DeRose Calculations reported in code "Incremental_Revenue_Bernanke.do."

[340] ██

[341] ██

[342] See Declaration of ████████, August 5, 2023, GOOG-AT-MDL-008842383 ("August 5, 2023 ████ Declaration") at ¶ 22 ("Google updated the Bernanke algorithms in 2019 to be compatible with the Unified First Price Auction. The updated version of Bernanke was sometimes referred to within Google as 'Alchemist.' The update was designed to maintain incentives for Google Ads advertisers to bid their true values even after Google transitioned to the Unified First Price Auction, while continuing to target a similar aggregate take rate for Google Ads as before the transition to the Unified First Price Auction."); see also GOOG-DOJ-14550102 at -102-104 ("Alchemist is a mechanism that: … Submits first price bids to publishers (while being truthful from buyer's perspective) … Satisfies margin constraint … Maximizes welfare for its spending … Alchemist Online satisfies both of the necessary and sufficient conditions of the Myerson's [sic] theorem and is truthful.").

[343] See Andrien Report Exhibit 5 (indicating that "First-Price Bernanke" started on 10/25/2019 and continued to the "present").

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bids coming into its auctions differently because of Alchemist. Instead, Alchemist is an optimization feature that Google Ads implements using only its own data (i.e., it did not rely on AdX data) before it submits a bid into the AdX auction.[344]

163.   Moreover, Professor Weinberg recognizes that Alchemist is "truthful," which means that bidders maximize their surplus by submitting bids equal to their own values.[345] As a result, there is no reason to believe Google Ads advertisers would have bid any differently if Alchemist had been publicly disclosed. Nor is there any reason to believe that publishers would set different floors if Alchemist had been disclosed. Because neither Mr. Andrien nor Professor Weinberg has provided any economic theory or empirical evidence to suggest that advertisers or publishers would have behaved differently had Alchemist been disclosed, they have provided no basis for assessing the number of transactions, if any, that could have been affected by the alleged deception regarding Alchemist. Similarly, because neither Mr. Andrien nor Professor Weinberg has provided any economic theory or empirical evidence to suggest that AdX treated incoming bids differently because of Alchemist, they have provided no basis for assessing the number of transactions, if any, that could have been affected by the alleged "equal footing" deception about Alchemist. As a result, in both cases, I conclude that the alleged deception regarding Alchemist impacted zero transactions, rather than the ▮▮▮▮▮ remaining after the other corrections described above, or the ▮▮▮▮▮ counted by Mr. Andrien."[346]

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[344] See GOOG-DOJ-06842351 at -359 ("We respect GDN-AdX firewall: we only utilize GDN data to optimize bidding strategy. Any AdX buyer can do this."). ▮▮

[345] Weinberg Report at ¶ 266 ("First-Price Project Bernanke has three components: (a) a bid optimizer for GDN users that makes their participation in AdX's first-price auction truthful, (b) collusion among GDN bidders, which increases GDN's payoff at the expense of publishers' revenue, (c) overbidding, which lowers GDN's and increases publishers' revenue."); id. at ¶ 47 ("A sealed bid single-item auction is truthful if each bidder receives the best possible outcome (given the other bidders' bids) by submitting a bid equal to their own value.").

[346] ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

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f. *Facebook Network Bidding Agreement*

164.   In discussing Google's Network Bidding Agreement (NBA) with Facebook, Mr. Andrien
asserts that "Google provided Facebook with advantages that were not available to other
auction participants, and because of the confidentiality of the NBA, such advantages were
not disclosed to other participants."[347] However, Mr. Andrien does not examine the extent
to which these alleged advantages actually impacted transactions.

165.   The Open Auction transaction data on which both Mr. Andrien and I rely show that, since
November 2019 (the date when Google allegedly stated that all bidders would be on an
"equal footing"),[348] ███

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H. Mr. Andrien Vastly Overstates the Number of Affected Transactions

166.   In my foregoing analysis, I have provided a number of reasons why Mr. Andrien's count
of ██████████████████ greatly exaggerates the number of transactions that could
have been affected by the alleged deception. After making all of the corrections described
above, the de-duplicated number of transactions that potentially could have been affected
by the alleged deception falls to ███████, a 98 percent reduction,[352] as shown in Figure
1 below.

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[347] Andrien Report at ¶ 53. The NBA is the "Network Bidding Agreement" between Facebook and Google. See
GOOG-TEX-00144513. Jedi Blue is Google's internal name for the NBA. FAC at ¶ 425.

[348] See Andrien Report at ¶ 99 and footnote 274.

[349] Calculation based on the AdX data that Andrien uses in his analysis, limited to Open Auction transactions and
excluding app transactions (identified based on the "user device" field).

[350] Moreover, in Section VII, I discuss additional reasons why one would expect the impact of the Facebook NBA
agreement to be zero.

[351] See Table C1 in Appendix C.

[352] ███
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██ Table C1 in Appendix C
demonstrates that Mr. Andrien's flawed approach also significantly exaggerates the number of affected transactions if
Google is found liable on only a subset of the alleged DTPA claims. See workpaper "Deduplicated Counts all
Combinations.xlsx" for more details.
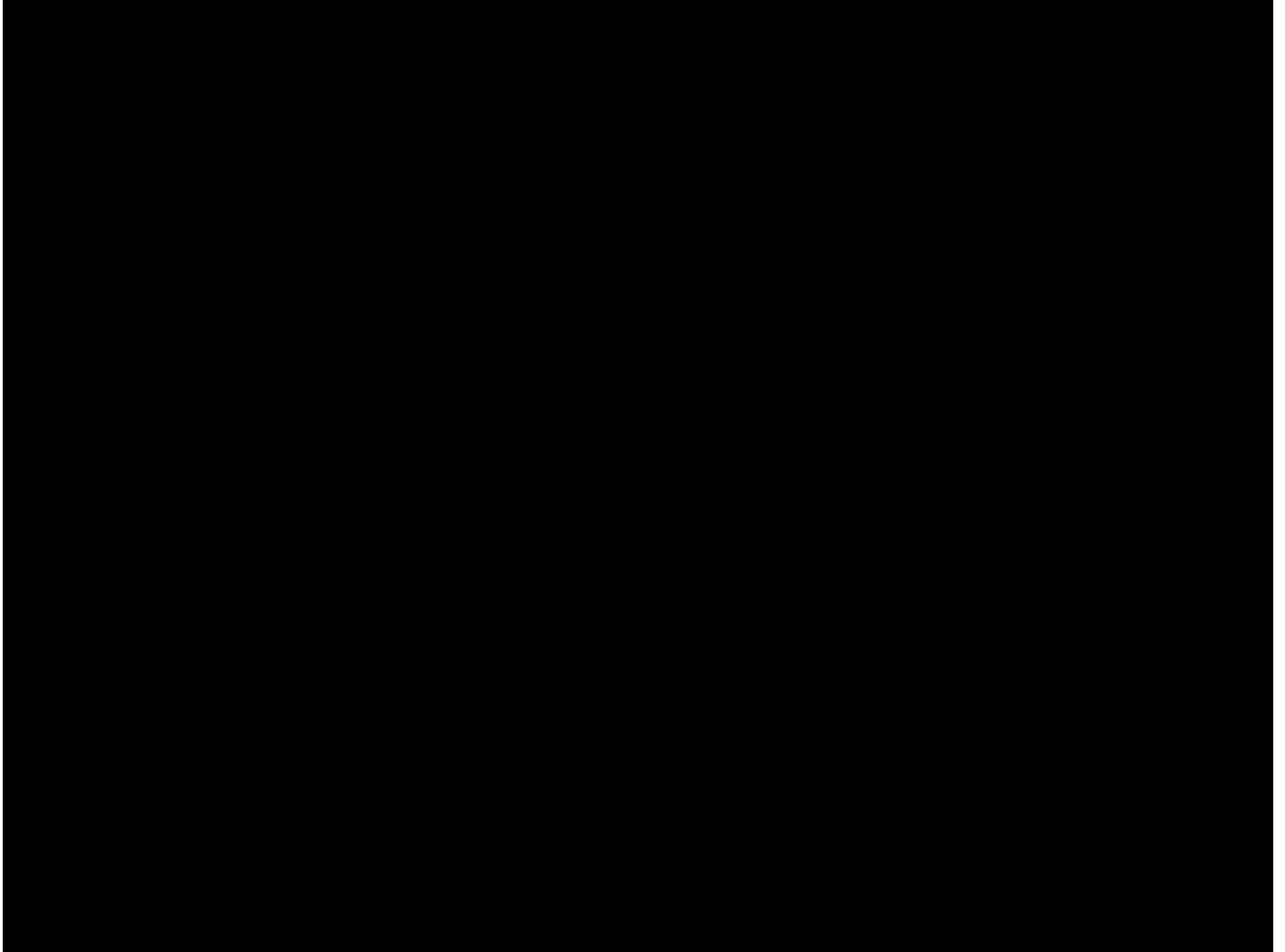
V.   Mr. Andrien Has No Basis for His Inflated Per-Violation DTPA Civil Penalties

167.   Mr. Andrien asserts that "reasonable and appropriate" per-violation penalties should range

from ███████████████ There is no economic basis for Mr. Andrien's proposed

penalties, which are unrelated to his penalties framework and vastly exceed Google's

profit per transaction.

A. Mr. Andrien Has No Basis for His Proposed Per-Violation Penalties

168.   Mr. Andrien does not explain or offer any methodology regarding how he arrived at the

per-violation penalty amounts that he proposes. Instead, he simply states that he bases his

per-violation penalties on "the information available to me as of today, the analysis

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[353] Andrien Report at ¶ 128 ████████████████████████████

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presented in this report, as well as my education, training and experience."[354] While Mr.
Andrien does discuss Google's overall gross revenue and profit, he does not draw any
connection between those aggregate amounts and his entirely *ad hoc* per-violation
penalties.

169.   As discussed in Section III, Mr. Andrien's framework indicates that penalties should be
calculated to deprive Google of the incremental benefits from the alleged deception. To
implement that framework in an economically appropriate way, Mr. Andrien should have
linked his per-violation penalties to the average incremental benefit Google received per
affected transaction, but he makes no effort to forge that connection.

B. Mr. Andrien's Per-Violation Penalties are Inflated Relative to His Framework

170.   My own economic analysis indicates that Mr. Andrien's proposed per-violation penalty
range appears to ███

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171.   As discussed in Section III.D., as matter of economics, profits, not net revenues, are the
correct metric of Google's gains.[356] ████████████████████████████

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[354] Andrien Report at ¶ 128 ("Based upon the information available to me as of today, the analysis presented in this
report, as well as my education, training and experience, I conclude that it would be reasonable and appropriate for
the trier of fact to assess a penalty in the range of ████████████ for each violation.").

[355] The calculations in the text do not purport to represent any analysis carried out by Mr. Andrien. Rather, these
calculations simply document that regardless of how Mr. Andrien arrived at his per-violation penalty amounts, they
are in fact roughly similar to ████████████████████.

[356] As noted above, profits rather than revenues are the appropriate measure of benefits to a firm. A firm can only
receive revenues by expending costs, and the benefit that a firm receives from a transaction must be measured by
netting out the costs incurred to generate that revenue. Such netting yields profit, which is the correct measure of the
benefit derived by the firm.

172.   Using a per-violation penalty amount equal to Google's profit per transaction would implement Mr. Andrien's framework by depriving Google of the full benefit that it received from an incremental transaction generated by the alleged deception.[357] For such incremental transactions, Mr. Andrien's framework would imply that the appropriate overall penalty could be determined by multiplying the number of such incremental transactions by ▮▮▮▮▮

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[357] These are the transactions that I categorized earlier as exhibiting a "quantity effect."

173.   As noted above, however, Mr. Andrien recognizes that not all transactions affected by the alleged deception are incremental. In addition to that "quantity effect," Mr. Andrien also describes a price effect related to transactions that would have occurred on AdX even without the alleged deception, but where the clearing price "was higher than it would have been absent the misconduct."[358] For those transactions, Google's gain is less than all of the profit from the transaction. Instead, Google's gain is only the increase in profit created by the *price increase attributable to the alleged deception*. Determination of Google's alleged benefits for these transactions requires estimation of such price increases and the associated rise in Google's profits.

174.   I estimate such benefits to Google in Section VII. For now, I simply note that the gains to Google from such transactions are, on a per-transaction basis, significantly smaller than ▓▓▓▓▓▓▓▓ profit that Google earned from each incremental transaction. Accordingly, if one were to average the benefits to Google from the "quantity effect" and the benefits to Google from the "price effect," one would arrive at an average per-violation penalty of ▓▓▓▓▓▓▓▓▓▓▓▓.

175.   Further, as I discuss above, Mr. Andrien's calculations of Google's display advertising operating profits are substantially overstated.[359] As such, the operating profit margin I use in my calculation above (row 6 of Table 2), ▓▓▓▓▓▓▓▓▓▓▓▓ ▓▓▓▓▓▓▓▓, are similarly overstated.

176.   These results show that Mr. Andrien's per-violation penalties are greatly inflated. The lower end of his penalty range is ▓▓▓▓▓▓▓▓▓▓▓▓▓ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ The upper end of Mr. Andrien's range is ▓▓▓▓▓▓▓▓▓ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ ▓▓▓▓ These per-violation penalties are illustrated in Figure 2.

[358] See Andrien Report at ¶ 110.
[359] See Section III.D.

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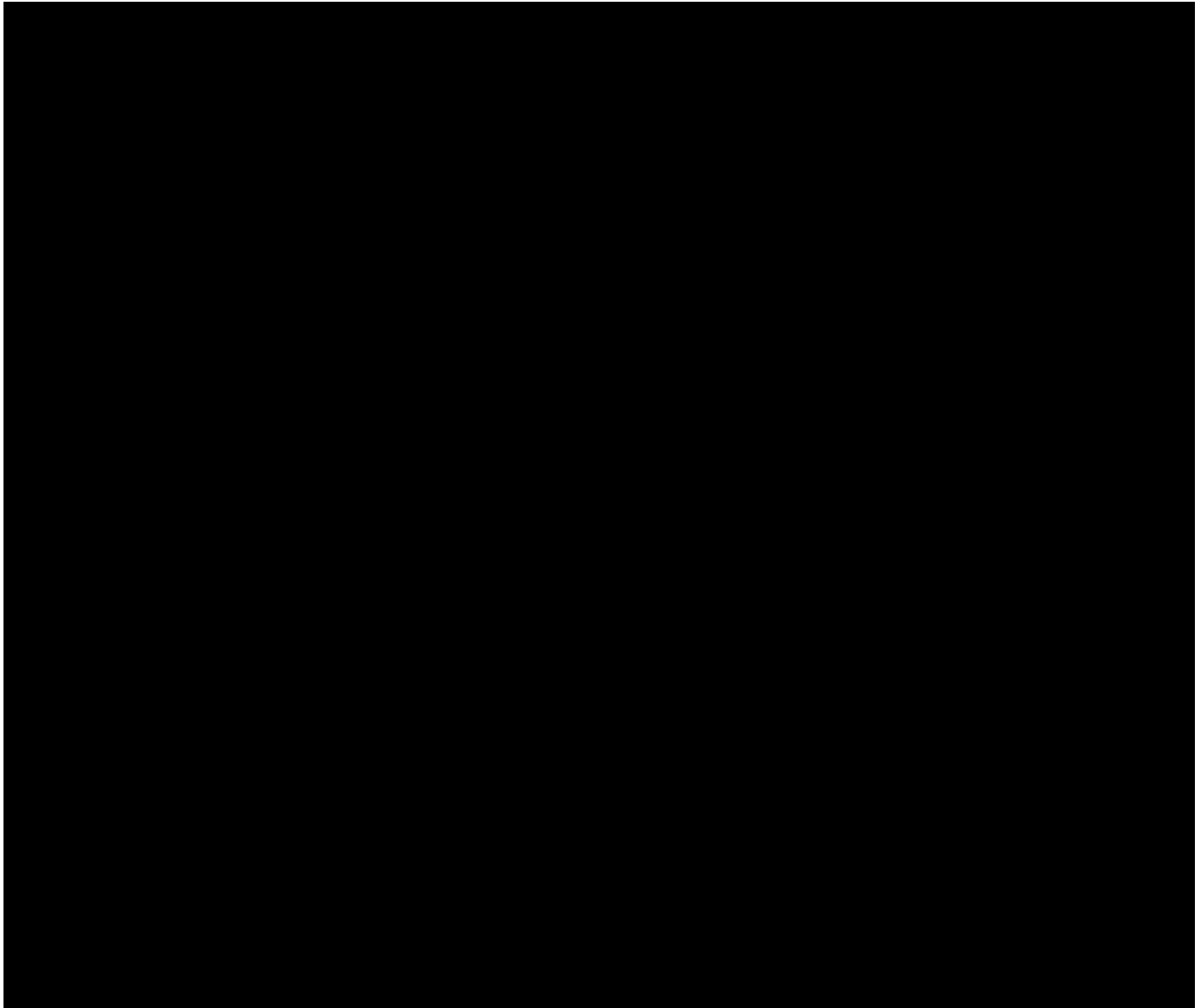
VI. The Cumulative Effect of Mr. Andrien's Errors Is That His Estimated DTPA Civil Penalties Are Grossly Overstated

177. This section demonstrates the combined impact of Mr. Andrien's many errors on his proposed DTPA civil penalties. These errors include a greatly inflated count of transactions and considerably inflated per-violation penalties. Mr. Andrien's total penalties are enormously inflated as a result.

178. Based on Mr. Andrien's de-duplicated transaction counts and his range of per-violation penalties, Figure 3 below shows that Mr. Andrien's flawed approach results in total DTPA

civil penalties ranging from $7.27 billion to $21.81 billion.[360] ███████████████
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179.   As discussed in Section V, a more appropriate—but still inflated—per-violation penalty

amount is ████████. My partial correction of Mr. Andrien's errors in counting

transactions (based on rows 1 to 6 of Table 1) reduces his count of ██████████

transactions ███████████████████████. As shown in Section IV.G, further limiting the

count to transactions where the alleged deception could have influenced the outcome of an

auction reduces Mr. Andrien's count of transactions by 98 percent, ████████.[363]

180.   As Figure 3 shows, using my partially corrected per-transaction penalty ██████████,

along with my partial correction of Mr. Andrien's errors in counting transactions, reduces

the penalty estimate to $141.3 million, which is 98 percent below the low end of Mr.

Andrien's minimum estimate of $7.269 billion.[364] Further, correcting his transaction count

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[360] Andrien Report at Table 4 and ¶ 130 ("Assessing this level of penalty per violation would result in a maximum of $21.81 billion in total penalties. The maximum represents total penalties if the trier of fact determined that penalties should only be assessed on the Bernanke claim covering the period November 2013 to present. The maximum also represents the cap on penalties if the trier of fact determines that penalties should be assessed to cover all claims as this figure is based on the total Open Auctions during this period and each auction should only be counted once as a violation.").

[361] Andrien Report at ¶¶ 95, Table 1, and 119. And even this number includes profit from activities that are unrelated to the challenged conduct in this case. For example, Mr. Andrien's ██████████ profit includes profits from AdMob, AdSense for Content, and Campaign Manager, as well as profit made by DV360 and Google Ads when they bid into non-Google exchanges. See *id.* at ¶ 92 ("In order to isolate the revenue and profit associated with the display advertising products at issue in this matter, I only include revenue and profits from the P&Ls related to AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads, which I understand are the products at issue in this matter."). Professor Skinner explains, however, that "Mr. Andrien's estimates of booked revenue and operating profit for 2020–2022 . . . would change if I limit his analyses to the at-issue DVAA products, i.e., to Google Ad Manager, Google Ads, and DV360." Skinner Report at ¶ 50.

[362] ██
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[363] Calculations based on workpaper "DTPA Transaction Count Tables.xlsx."

[364] Note that the above corrections continue to assume *arguendo* based on Mr. Andrien's assumption, that all Open

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by including only those transactions that were affected by the alleged deception (as described in Section IV.G) reduces Mr. Andrien's penalty estimate to $44.9 million, which is 99.4 percent below the low end of his penalty range. These reductions are even greater if one compares them to the upper end of his penalty range ($21.81 billion), which is three times larger than the low end of his penalty range ($7.269 billion).

Figure 3
Mr. Andrien's and Partially Corrected Penalty Estimates, Based on De-Duplicated Counts
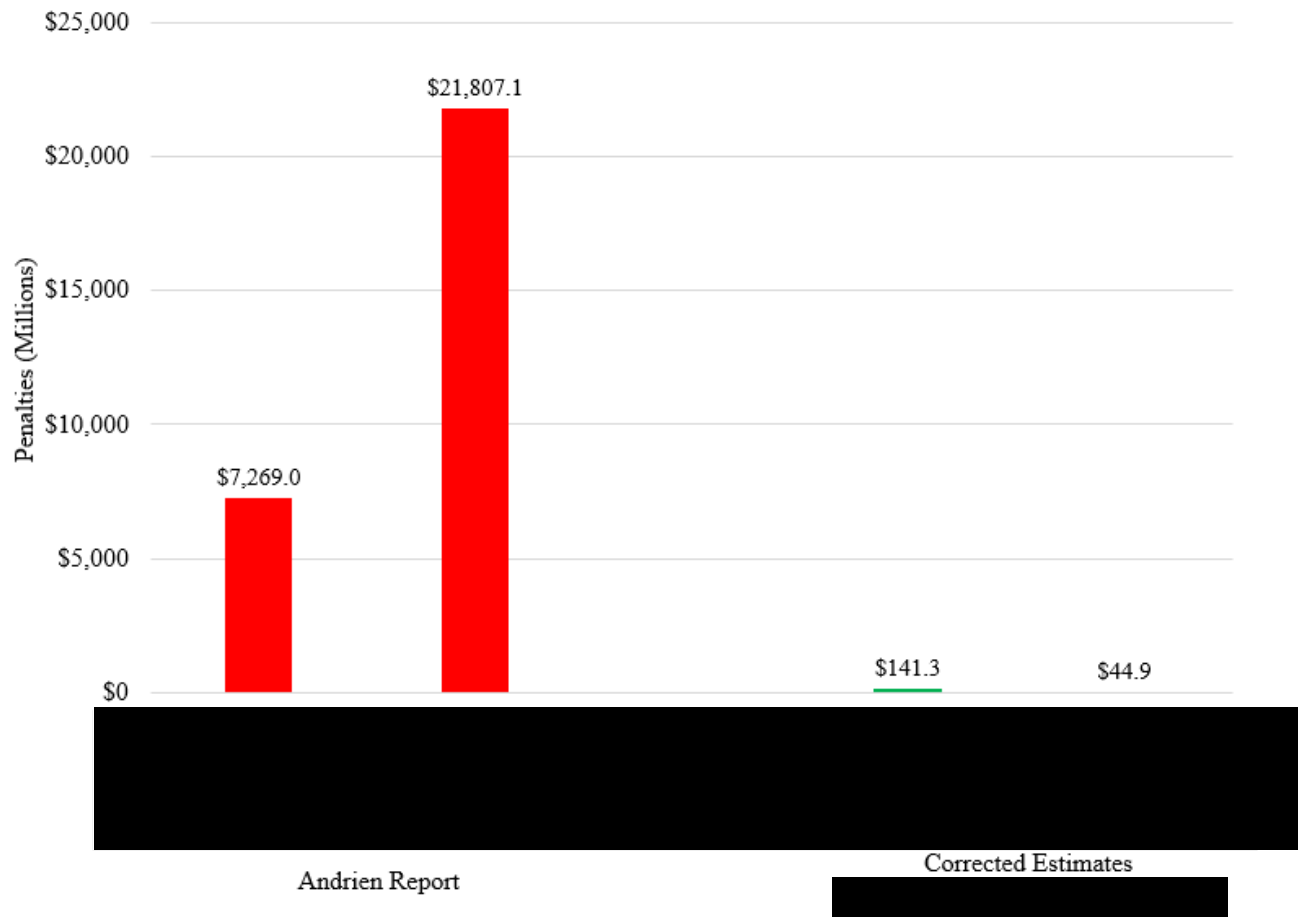
Notes & Sources: [1] See Tables 1, C.1, and C3. [2] "Partially Corrected Counts" implements corrections 1-6 in Table C1.

181.   I emphasize that, while these estimates correct some of the serious errors in Mr. Andrien's analysis, they share a key deficiency with Mr. Andrien's approach to penalties measurement: they do not represent Google's *incremental* benefits from the alleged

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Auction transactions were affected, and the corrections above just focus on other errors in his transaction counts. See Andrien Report at ¶ 98.

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deception, which are the touchstone of Mr. Andrien's framework.

182.   When estimating the incremental benefits to Google from the alleged deception, it is only
        correct to use a per-violation penalty of ▮▮▮▮▮▮ if one assumes that *all* of the profit
        associated from each affected transaction was generated by the alleged deception. The
        incremental effect of the alleged deception on Google's profits may be much smaller,
        resulting in much smaller per-violation penalties.

183.   In other words, the analysis in Section IV identifies transactions where the auction
        outcome *might* have been different as a result of the alleged deception. Estimating the
        benefits to Google of the alleged deception, however, requires identifying transactions
        where the clearing price not only *could* have been different absent the alleged deception,
        but actually *would* have been different *in a way that benefitted Google*.

VII.   A Direct Assessment of Google's Benefits from the Alleged Deception Demonstrates that Mr. Andrien Proposes Wildly Disproportionate DTPA Civil Penalties

184.   Mr. Andrien contends that the appropriate penalty "must eliminate Google's financial
        incentive to engage in the alleged misconduct."[365] However, he ignores the obvious way to
        apply that framework: by directly assessing and estimating the incremental benefits to
        Google from the alleged deception about each program. While Mr. Andrien asserts that
        the evidence and data in this case are insufficient to reliably estimate these gains,[366] I do
        exactly that in this Section. In doing so, I emphasize that benefits from the alleged
        deception are conceptually different from benefits from the *programs* in question.

185.   I assess whether, and how much, Google's profits increased as a result of the alleged
        deception about Reserve Price Optimization, Dynamic Revenue Sharing versions 1 and 2,
        Project Bernanke, Alchemist, and the alleged "equal footing" deception associated with
        Alchemist and the Facebook NBA. I do so in two ways. First, I conceptually address the
        extent to which Google profited from the alleged deception about each program based on
        the evidence discussed in Section II concerning how advertisers and publishers make

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[365] Andrien Report at ¶ 106.

[366] Andrien Report at ¶ 11(f)(ii) ("I am unable to determine Google's total incremental benefits from the misconduct
because Google has not produced information sufficient to determine even the direct benefits from the alleged
misconduct, much less the indirect benefits from the alleged misconduct.").

decisions in the real world. Second, consistent with Mr. Andrien's approach[367] but contrary to the evidence discussed in Section II, I perform an empirical analysis that assumes (contrary to the evidence in this case) that advertisers and publishers do not learn and adapt their strategies in response to the feedback they receive in the marketplace.[368] Using that approach, I estimate Google's incremental profit from the alleged deception about RPO, DRS v1, DRS v2, and Bernanke.

A. Reserve Price Optimization

186.   Following a period of limited-scale experimentation, Google launched Reserve Price Optimization (RPO) on or about April 2015.[369] The company disclosed RPO in May 2016.[370] RPO was discontinued in September 2019 with the introduction of the Unified First Price Auction (UFPA), and Google publicly announced its reintroduction of a version of RPO designed for first price auctions in June 2022.[371]

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[367] See, e.g., Andrien Report at ¶ 41 ("It is my understanding that Google concealed material information from publishers and advertisers by not disclosing DRSv1, which negatively impacted them and *prevented them from employing optimal strategies*.") (emphasis added); *id*. at ¶ 34 ("[B]y concealing RPO, Google prevented publishers from effectively optimizing revenue.").

[368] The fact that advertisers and publishers make decisions by continually monitoring return metrics and optimizing indicates they would have arrived at the same strategies in the but-for world as they did in the actual world. As discussed in each subsection below, that implies that Google did not benefit from the alleged deception. By assuming that advertisers would behave differently in the but-for world (contrary to the evidence of advertiser and publisher behavior in the real world), the quantitative estimates discussed in the sub-sections below overstate the gains to Google from the alleged deception, and thus are conservative.

[369] See Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, May 24, 2024, at 12 ("Reserve Price Optimization launched on or about March 31, 2015. RPO v.2 subsequently launched on or about October 5, 2015. Prior versions of RPO were disabled along with the Google Ad Manager switch to first-price auctions in September-October 2019. In June 2022, Google launched a version of RPO designed for Ad Manager's first-price auction, known as Optimized Pricing, on select web traffic, and it was extended to all web traffic in January 2023."); see also Email from _____ (Google), "Re: [drx-pm] LAUNCHED! Dynamic Pricing ('RPO') for AdX sellers," November 11, 2015, GOOG-DOJ-07235914 at -915 ("Between April and October [2015] we launched and improved new systems to dynamically set auction reserve prices for AdX sellers."); May 2, 2024 _____ at ¶ 3 ("In April 2015, Google launched Reserve Price Optimization for general availability (having conducted small scale testing of the feature in 2014).").

[370] See Bellack, Jonathan, "Smarter optimizations to support a healthier programmatic market," *Google Ad Manager Blog*, May 12, 2016, available at https://blog.google/products/admanager/smarter-optimizations-to-suppor/ (last accessed July 26, 2024); GOOG-AT-MDL-C-000015606 at -611-612; see also Email from _____ (Google), "[ANNOUNCED] Smarter optimizations for DoubleClick Ad Exchange," May 12, 2016, GOOG-DOJ-04934481 at -481.

[371] See GOOG-DOJ-14030931 at -931 ("_____ _____"); "2022 Google Ad Manager releases archive," *Google Ad Manager Help*, June 6, 2022, available at https://support.google.com/admanager/answer/11586212 (last accessed July 25, 2024) (June 6, 2022 archived release on "Manage inventory" notes that "Optimized pricing increases auction

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187.   The plaintiffs allege that Google's failure to disclose RPO was deceptive because, while
the company represented to advertisers that it ran second-price auctions for display ad
impressions, RPO implemented changes that "meant that the auction did not operate as a
sealed second price auction."[372] According to their theory, had Google disclosed RPO,
advertisers allegedly would have "engaged in alternative bid strategies that did not
disclose their true value for each impression."[373] Similarly, Professor Weinberg asserts
that "if the advertiser were aware of RPO, they would have shaded their bid from the
beginning."[374] Mr. Andrien reiterates this assertion.[375] Thus, the plaintiffs' theory of harm
regarding the alleged deception about RPO hinges on the extent to which advertiser
bidding behavior in AdX Open Auctions in the actual world was different from their
bidding behavior in the but-for world absent the alleged deception.

188.   In assessing the extent to which the actual and but-for worlds differ, it is important to
consider the economics underlying advertiser behavior. As described in Section II.B., as a
general rule, advertisers, advertising agencies, and ad buying tools monitor performance
and run experiments to help advertisers optimize their bidding strategies. By contrast,
neither Mr. Andrien nor Professor Weinberg have presented evidence that advertisers
commonly study announcements regarding optimization features and formulate their
strategies based on those announcements. The fact that advertisers continually monitor
performance and learn to adopt optimal strategies based on their observations means that
they would continue to do so regardless of whether RPO was publicly announced. As a
result, outcomes in the actual and but-for worlds would be the same, which indicates that
Google did not profit from the alleged deception.

189.   Advertisers and their advertising agencies and ad buying tools are particularly likely to
test for the presence of dynamic floors like RPO, and to develop optimal responses to

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floor prices to more accurately reflect and protect your inventory's value. Optimized pricing is enabled by default, but
can be disabled via your network settings"); see also May 2, 2024 ███████████ at ¶ 7 ("RPO was disabled in
2019 following Google's move to the Unified First-Price Auction. In June 2022, Google launched a version of RPO
designed for the first-price auction known as Optimized Pricing on select web traffic, and it was extended to all web
traffic in January 2023. Publishers may opt out of Optimized Pricing.").

[372] FAC ¶ 532.

[373] FAC ¶ 533.

[374] Weinberg Report at ¶ 285.

[375] See Andrien Report at ¶ 35, footnote 94 ("As Dr. Weinberg opines, if advertisers had been aware of RPO, they
could have improved their gains over time by shading their bids from the beginning.").

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them.[376] In fact, dynamic floor optimization on AdX existed even before RPO, which means that advertisers should have already been attuned to them and been prepared to adjust their strategies to account for dynamic floors.[377] Similarly, dynamic price floors were common in the industry, which means that advertisers, their ad buying tools, and their advertising agencies had to develop strategies to optimally respond to them.[378] Hence

[376] Email from ▆▆▆▆▆▆ (Google), "Re: [drx-pm] Op-ed that RIB should move to first price auction -- what do you think?," August 15, 2015, GOOG-DOJ-13350192 at -198 ("[S]mart buyers ▆▆▆▆ use a portion of budget for price discovery and probing of auction dynamics to find how to bid the lowest and not be the ones stuck paying the highest bid premium in a pseudo 1st price auction…. At the end of the day pubs care about yield, they don't care the slightest about auction dynamics.").

[377] Starting in 2011 (i.e., well before the launch of RPO), Google offered publishers a Minimum CPM Recommendation feature, internally called AdX Seller Reserve Price Optimization. See GOOG-DOJ-12439154 at -154 (AdX Seller Reserve Price Optimization "Status: launched on Q2 2011"); see also Semret, Nemo, "Introducing Minimum CPM Recommendations on DoubleClick Ad Exchange," *DoubleClick Publisher Blog*, November 1, 2011, available at https://doubleclick-publishers.googleblog.com/2011/11/introducing-minimum-cpm-recommendations.html (last accessed July 25, 2024) ("[W]e've heard from our publisher partners that they would like to better manage their minimum CPM, sometimes called the reserve or floor price, which dictates the minimum price at which buyers can purchase their inventory. But setting the best minimum price can be tricky. Setting it too high can price publishers out of transactions, while setting it too low can sometimes leave money on the table. Many publishers optimize their minimum CPM using a trial and error approach, which can be time consuming and potentially costly…. Today, we're happy to announce the launch of Minimum CPM Recommendations for DoubleClick Ad Exchange publishers. This feature automatically recommends an optimal minimum cpm for each eligible ad slot in the Ad Exchange auction. It also automatically generates a graph that provides better visibility into how different floor prices might affect a publisher's bottom line."). The Minimum CPM Recommendation feature used ▆▆▆▆▆▆▆ bids to determine optimal floor price recommendations, which it provided to publishers along with a graph showing how different floors were expected to affect publisher revenue. See GOOG-DOJ-12439154 at -156 (▆▆"). The publisher had to set the floor manually. GOOG-AT-MDL-010338120 at -120 ("[T]he min cpm is set by a human entering a number into a text box in the adxseller UI."). Unlike the Minimum CPM Recommendation feature, RPO increased floor prices for publishers automatically.

[378] 30(b)(1) Deposition of ▆▆▆▆ (Google), November 15, 2023, at 174:15 – 175:5 (explaining that "in any auction marketplace … it is expected that the seller tries to come up with smart way to come up with a reserve price to get and claim a bigger share of the profit. … it is always expected that the auctioneer, they try to come up with the reserve prices that maximizes their – basically, their … revenue."); ▆▆▆

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it is not obvious that the implementation of RPO created *further* incentives for advertisers to perform tests and develop optimal responses, such as bid shading, to price floors. Thus, even if RPO had been disclosed, it is unlikely that advertisers would have changed their behavior or strategies from what they were already doing.[379]

190.   As a result, there are good economic reasons to believe that a but-for world without the

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Industry press also confirm ad exchanges generally have features like dynamic floor pricing. See Picard, Eric, "Publishers, Don't Settle for Below-Floor Pricing," *AdExchanger*, November 1, 2023, available at https://www.adexchanger.com/the-sell-sider/publishers-dont-settle-for-below-floor-pricing/ (last accessed July 25, 2024) ("Supply-side platforms (SSPs) were born to protect publishers' interests in an automated auction environment. They introduced features like dynamic floor pricing to ensure that demand-side platforms (DSPs) pass on their best bids into the auction."); Bender, Gabe, "Dynamic Price Floors: A Call For Standardization," *AdExchanger*, June 3, 2016, available at https://www.adexchanger.com/the-sell-sider/dynamic-price-floors-call-standardization/ (last accessed July 26, 2024) ("Second-price auctions do, however, perpetuate price inefficiencies by creating large gaps between the buyer's winning bid and the price they actually pay.… Most exchanges have responded with a range of tactics to reduce this inefficiency, claiming to offer sophisticated dynamic price floors. In reality, these platforms resort to soft price floors, phantom bidders, buyer discrimination or some mix of the above, none of which are particularly effective. These opaque solutions end up resembling first-price auctions, jeopardizing the trust of both buyers and sellers. Demand-side platforms (DSPs) then respond by sometimes contractually prohibiting such practices.").

[379] See 30(b)(1) Deposition of ███████ (Google), November 15, 2023, at 174:15-175:5 (Google buyside engineer explaining that "in any auction marketplace … it is expected that the seller tries to come up with smart way to come up with a reserve price to get and claim a bigger share of the profit. … it is always expected that the auctioneer, they try to come up with the reserve prices that maximizes their – basically, their … revenue."); ███████

As discussed in Section II.B, there is also evidence that ad buying tools actively probed general auction dynamics in order to generate the best returns possible for advertisers. See Email from ███████ (Google), "Re: [drx-pm] Op-ed that RTB should move to first price auction – what do you think?," August 15, 2015, GOOG-DOJ-13350192 at -198 ("[S]mart buyers ██████ use a portion of budget for price discovery and probing of auction dynamics to find how to bid the lowest and not be the ones stuck paying the highest bid premium in a pseudo 1st price auction…. At the end of the day pubs care about yield, they don't care the slightest about auction dynamics.").

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alleged deception about RPO would be the same as, or largely similar to, the actual world. In both worlds—with and without the disclosure of RPO—advertisers would have learned how to shade their bids to arrive at the same optimal bidding strategy. Similarly, to the extent that it was optimal for publishers to change their floors given the operation of RPO,[380] publishers would have done so regardless of whether RPO was disclosed because, in both the actual and but-for worlds, they would monitor returns and perform experiments to arrive at the optimal price floors.[381] Moreover, if some advertisers or publishers were uninterested or unskilled at monitoring returns or optimally adapting, there is no evidence to suggest that such parties would respond with greater interest or skill to disclosures about RPO. As a result, the economics implies that Google was unlikely to benefit from the alleged deception about RPO because the underlying behavior of publishers and advertisers was unlikely to be meaningfully different.

191.   This conclusion is supported by both ordinary-course-of-business documents[382] and an empirical analysis of the available data. For that empirical analysis, I use the fact that, on May 12, 2016, Google announced that AdX was using historical data to set price floors, the objective of which was to increase publishers' revenue.[383]

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[380] Mr. Andrien asserts that "by concealing RPO, Google prevented publishers from effectively optimizing revenue." Andrien Report at ¶ 34. In doing so, Mr. Andrien relies on Professor Weinberg, who asserts that "via concealing RPO, Google prevented the publishers from effectively optimizing revenue." Weinberg Report at ¶ 279. However, to my knowledge, none of the plaintiffs' experts have proposed a theory by which publishers would have changed their floors in a way that would have caused an unambiguous reduction in Google's profit. As a result, it is ambiguous whether this behavioral response by publishers implies that the deception increased Google's profit.

[381] As I discussed in Section II.B, publishers' decisions about floor prices are inherently the result of a data driven process where floors are adapted to the bidding behavior of advertisers. For example, Google's RPO feature itself selected publisher-specific revenue maximizing floor prices using *data* on the bids on a publisher's inventory from the previous day. See GOOG-DOJ-13199480 at -483 (RPO used a ▮▮▮▮▮ pipeline to compute [a] pricing file based on ▮▮▮▮▮ data"). At a high level, RPO "involve[d] 3 simple steps": (i) "Bucket your impressions by features you believe are important to buyers, and record the winning [historical] bids and [historical] transaction prices in each bucket." (ii) "For each bucket, generate a histogram of historical bids and [historical] transaction prices. Use this histogram to model what the [publisher] revenue would be at a range of possible reserve prices." (iii) "Pick a reserve price that maximizes predicted revenue [for the publisher], constrained to limit the fraction of bids it eliminates [by setting the reserve price higher] (to preserve match rate)." GOOG-DOJ-07235914 at -915, 916.

[382] See, e.g., Email from ▮▮▮▮▮ (Google), "Re: Observing optimizations (RPO?) in the wild," March 18, 2016, GOOG-TEX-00982249 at -249 ("▮▮▮▮▮ *id*. at -259 ("Another report of 'dynamic floors' being observed."); see GOOG-DOJ-05311280 at -280 ▮▮▮▮▮).

[383] See Bellack, Jonathan, "Smarter optimizations to support a healthier programmatic market," *Google Ad Manager Blog*, May 12, 2016, available at https://blog.google/products/admanager/smarter-optimizations-to-suppor/ (last

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192.   This disclosure provides the opportunity to test directly how the alleged deception regarding RPO affected the clearing prices (i.e., CPMs) of AdX auctions. A finding that CPMs fell abruptly following this May 2016 disclosure, or in the months after, would indicate that Google earned higher profit as a result of the failure to disclose RPO earlier than it would have absent the alleged deception. Such a pattern would also suggest that bidders' strategies adapted to the public disclosure of information about RPO and thus would be consistent with plaintiffs' view of how advertisers behave.[384] On the other hand, a finding that CPMs did not fall after the disclosure of RPO would be inconsistent with the plaintiffs' theory and indicate that the alleged concealment of RPO did not generate additional profit for Google via higher clearing prices. This result could occur because advertisers' optimal strategy in response to a fully disclosed RPO would have involved little to no bid shading, because advertisers had already learned how to shade their bids and so had already adapted to RPO prior to the public disclosure, or because announcements about optimization features are simply not a primary focus of advertisers in choosing their strategies.

193.   I test for an abrupt decline in clearing prices using an econometric methodology known as "regression discontinuity design" which is commonly used in modern economics, and is in part responsible for what Nobel Laureate and MIT Professor of Economics Joshua Angrist has called the "credibility revolution" in empirical economics.[385] The intuition behind the approach is that, so long as other determinants of the outcome vary "smoothly" (i.e., do not change abruptly) across the disclosure "threshold" (i.e., around the date of the disclosure) and are accounted for by properly fitting the underlying trends in the data, then any discontinuity in the outcome that occurs at the time of the announcement is properly

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accessed July 26, 2024) ("Optimized pricing in the Open Auction uses historical data to automate the post-auction analysis and updating of floor prices that publishers already do, and takes it a step further."); GOOG-AT-MDL-C-000015606 at -611-612; see also Email from ████████████ (Google), "[ANNOUNCED] Smarter optimizations for DoubleClick Ad Exchange," May 12, 2016, GOOG-DOJ-04934481 at -481.

[384] Note that, under plaintiffs' theory, the disclosure created, at a minimum, a substantial shift in public information in the market which, even if not understood by all, would have led to significant changes in bidding.

[385] See Angrist, Joshua D. and Jörn-Steffen Pischke, "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con Out of Econometrics," *Journal of Economic Perspectives*, Vol. 24, No. 3, 2010, at 3-30. The increased popularity of this method can be seen in Figure 6.1 of a commonly used graduate-level textbook called *Causal Inference: The Mixtape* by Dr. Scott Cunningham, Yale University Press, 2021, at 241-252, available at https://mixtape.scunning.com/06-regression_discontinuity (last accessed July 25, 2024).

interpreted as the effect of the disclosure.[386] I also test for effects in the months following the announcement.

194.   The disclosure of RPO is well-suited for this approach because, to my knowledge, no major optimization features changed in May of 2016 that would cause an abrupt change in auction clearing prices.[387] In addition, the disclosure itself was likely unanticipated, and there was no opportunity for the type of strategic behavior by market participants that would invalidate the approach.[388] One element of this regression discontinuity approach is shown in Figure 4, which graphically presents the impact of the disclosure of RPO on average CPM in AdX. More specifically, I focus on the natural logarithm of CPM, which means that differences from one month to another can be interpreted as percentage changes.[389] Note that, to isolate variation that is potentially due to RPO, I also follow standard practice and adjust the data to remove month-to-month changes attributable to seasonal factors.[390]

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[386] This is referred to as the "continuity assumption" of regression discontinuity design. See Cunningham, Scott, *Causal Inference: The Mixtape*, Yale University Press, 2021, at 252-282, available at https://mixtape.scunning.com/06-regression_discontinuity (last accessed July 25, 2024).

[387] I note that RPO was launched in April 2015, over one year before the announcement. As a result, RPO implementation itself does not affect CPM around the time of the announcement and my analysis can clearly isolate the effect of the alleged deception.

[388] Economists refer to this type of strategic behavior as "manipulation around the threshold." For example, in this setting, one might ask whether some advertisers could have postponed ad spending from the days before the RPO disclosure to the days after the RPO disclosure. The absence of manipulation around the threshold is a technical condition required for the validity of the empirical exercise. See McCrary, Justin, "Manipulation of the running variable in the regression discontinuity design: A density test," *Journal of Econometrics*, Vol. 142, No. 2, 2008, pp. 698-714.

[389] For example, a change of 0.1 is interpreted as a 10 percent increase. See Ford, Clay, "Interpreting Log Transformations in a Linear Model," *University of Virginia Library*, August 17, 2018, available at https://library.virginia.edu/data/articles/interpreting-log-transformations-in-a-linear-model (last accessed July 25, 2024).

[390] Seasonal adjustment is a standard and accepted technique that is applied by econometricians to remedy issues that otherwise would render statistical inference unreliable. For an intuitive, if simplified, explanation of the need for and uses of seasonal adjustment, see, e.g., Maddala, Gangadhar Rao S., *Econometrics*, McGraw-Hill College, 1977 at 338-342. For a more advanced treatment, see, e.g., Greene, William H., *Econometric Analysis*, Prentice Hall, 7th ed. 2012, at 192-194.

I perform seasonal adjustment using the full sample of data from 2014 through 2019. The intuition of this seasonality adjustment is that, if CPMs are 10 percent higher in December across the full sample, I reduce each December CPM accordingly. Formally, I do this by regressing the log CPM on month fixed effects. The residuals from this regression can be interpreted as changes in CPM that are not explained by seasonality. I then compute the seasonally-adjusted CPM for each month in the sample by adding the residuals from that regression to the average outcome over the 21-month period that includes a window around the disclosure in May of 2016. Adding the average CPM is just a normalization that shifts up the monthly residuals by the same amount in each month but has no effect on the

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Figure 4
Natural Logarithm of Seasonally-Adjusted CPM in AdX Auctions
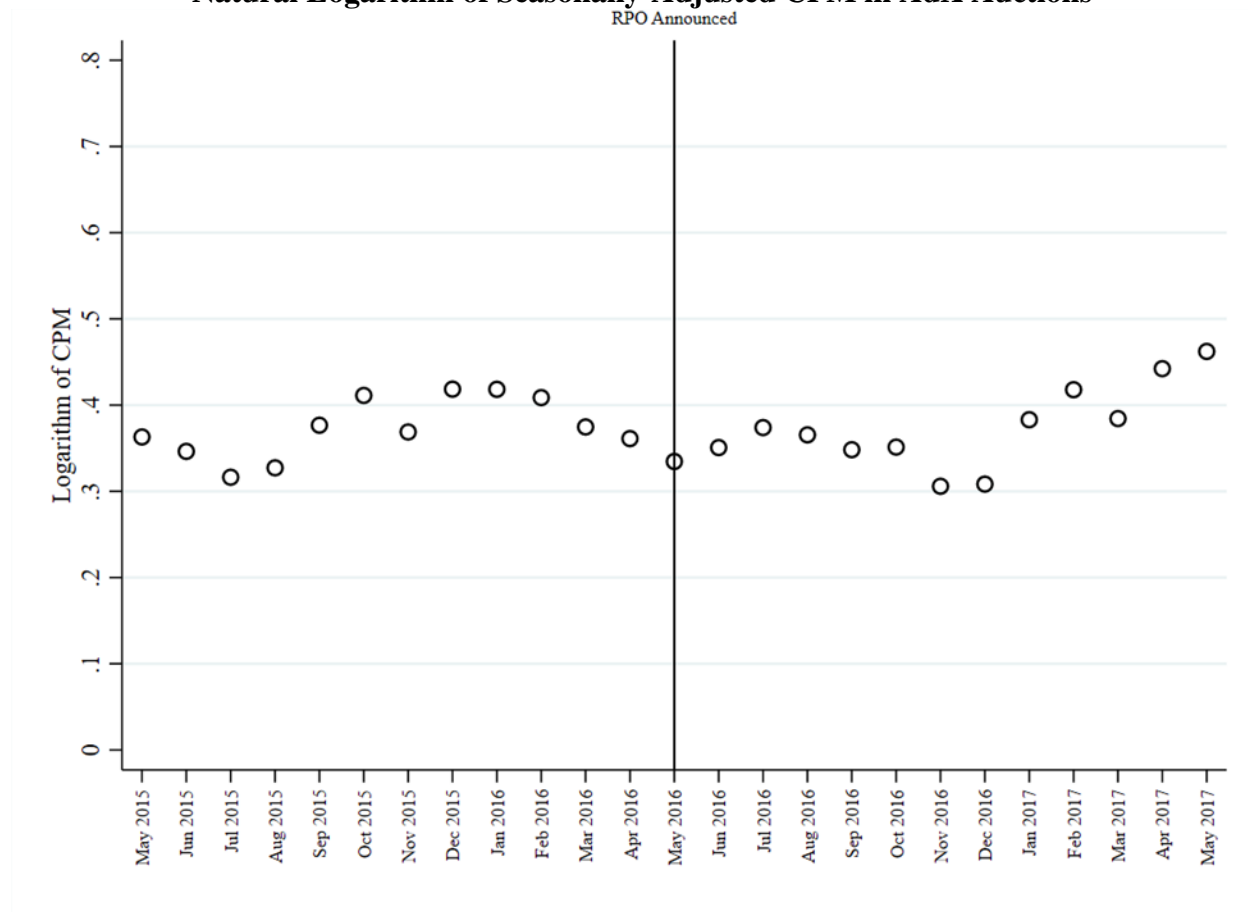
Notes: [1] Limited to U.S. users. [2] Excludes app and video transactions. [3] CPM is seasonally adjusted.
Sources: AdX Data (see Appendix H for Bates numbers).

195.   Figure 4 shows no evidence of a reduction in average CPM in AdX following the

disclosure. Rather, average CPM appears to vary smoothly around the time of the

disclosure. This result contrasts directly with the plaintiffs' and their experts' assertions

that the alleged deception caused advertisers to pay higher prices than they would have

but-for the alleged deception.[391] If the plaintiffs and their experts were correct, then

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resulting estimates. Results are robust to using alternative numbers of months before and after disclosure (e.g., 12 or
8), as Figure 4 below illustrates.

[391] See Andrien Report at ¶ 35 ("Namely, I understand that Google's representation that it was running a second-price
auction encouraged advertisers to bid their true value for impressions, which over time caused later AdX reserve
prices to increase."); Weinberg Report at ¶ 285 ("[I]f the advertiser were aware of RPO, they would have shaded their
bid from the beginning."); FAC ¶ 533 ("Google failed to disclose that it would use historical bidding information to
artificially drive up the second price, by increasing publisher's preset price floor and replacing it with an artificially

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publicly revealing RPO should have led advertisers to reduce their bids, which would in turn reduce CPM. I find no evidence of such reductions.

196.   In Table 3, I continue this analysis with regression estimates of the discontinuity at the time of the disclosure.[392] To assess robustness, I present a variety of alternative specifications: (i) I use different numbers of months of data (24 months of data – *i.e.*, 12 months of data both before and after the disclosure – as well as 20, 16, 12, and 8 months); and (ii) I use linear "fits" of the data (which is the assumed "shape" of how CPM changes over time) for all time windows, as well as quadratic fits for the larger data sets where "overfitting" is less of a concern.[393]

Table 3
Estimated Effect of Google's Disclosure of RPO on CPM

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# of Months Included	24	24	20	20	16	16	12	8
Assumed Functional Form (Quadratic or Linear)	Quad.	Lin.	Quad.	Lin.	Quad.	Lin.	Lin.	Lin.
Estimated effect of disclosure[1]	0.023	-0.087	0.064	-0.069	0.058	-0.020	0.007	0.024
P-value from a two-sided test of statistical significance (t-statistic based)[2]	[0.813]	[0.208]	[0.404]	[0.25]	[0.554]	[0.589]	[0.95]	[0.453]

Notes: [1] Estimates are interpreted as the effect of the May 16, 2016 disclosure of the mechanics underlying RPO, and are derived using the natural logarithm of CPM the dependent variable. [2] The test of statistical significance is the two-sided empirical p-value from a permutation test, which measures the fraction of possible t-statistics that are at least as extreme, in absolute value, as the t-statistic from the estimated effect of the actual May 16, 2016 disclosure. It comes from estimating "effects" of placebo policies using time periods of the same length throughout the full sample. To mirror the non-placebo regressions, the placebo disclosure month is excluded from each regression. [3] CPM is seasonally adjusted using data from 2014 to 2019. [4] Data are limited to US users, Open Auctions, web, and non-video transactions. [5] May 2016 is excluded from the sample, since the mechanics of RPO were publicly disclosed midway through that month.
Sources: AdX Data (see Appendix H for Bates numbers)

197.   Results from Table 3 indicate that disclosure of RPO was associated with no meaningful changes in average CPM in AdX. In particular, none of the changes are statistically different from zero. Moreover, the point estimates vary from positive to negative, and this variation in sign confirms a lack of systematic evidence of significant change.

198.   More specifically, the estimated changes in CPM range between negative 0.087 log points

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inflated floor derived from advertiser's historical bidding information. This resulted in the advertiser paying significantly higher prices than the true second price.").

[392] Results from regression discontinuity analysis is included in workpaper "RD Regression Tables.xlsx."

[393] See Gelman, Andrew and Guido Imbens, "Why High-Order Polynomials Should Not Be Used in Regression Discontinuity Designs," *Journal of Business & Economic Statistics*, 2018.

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(-8.3%) in Column 2, and positive 0.064 log points (6.6%) in Column 3.[394] While some estimates from approaches that use more data and a linear "fit" result in negative estimates (i.e., Columns (2) and (4)), allowing for either a more flexible quadratic fit (such as in Columns (1) and (3)) or using only data that are closer to the date of the announcement results in estimates that are often positive and frequently close to zero. More importantly, the lack of statistical significance of any of these estimated changes means that, under the standards commonly applied by economists, it cannot be established that any of these changes are statistically different from zero. As a result, the appropriate interpretation of the results in Table 3, as well as the underlying data shown in Figure 4, is that there is no evidence that the disclosure of RPO resulted in advertisers on average paying lower CPMs on AdX transactions and, thus, no evidence that the alleged deception about RPO increased Google's net revenue or profits by inflating CPM.

199.   In order to assess whether the estimates in Table 3 are statistically different from zero, I employ a method called permutation-based inference, also known as randomization inference, which is commonly used in applied economics.[395] Specifically, for each column in Table 3, I constructed every possible data series of the same length and assumed that a "placebo" (i.e., not occurring in reality) disclosure occurred in the middle of that series. For example, for Column (1): (i) I constructed every possible 25-month sample from January 2014 through December 2019 (i.e., a sample consisting of 12 months before and 12 months after the month of the placebo event, plus the month of the event);[396] (ii) I

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[394] In this semilogarithmic regression, the percentage change of the dependent variable is given by $100 \times (\exp(\beta) - 1)$, where β is the estimated coefficient of the discrete variable under consideration. See, e.g., Halvorsen, Robert and Raymond Palmquist, "The Interpretation of Dummy Variables in Semilogarithmic Equations," *American Economic Review*, Vol. 70, 1980, pp. 474-75. Here, the discrete variable at issue takes the value of 1 after the disclosure of RPO and zero otherwise. In column (2) of Table 3, the value of β is -0.087. Hence the percentage change in the natural logarithm of CPM following the RPO disclosure can be calculated using the following equation: $100 \times (\exp(-0.087) - 1) = -8.3\%$. The estimated increase in CPM in column (3) is likewise calculated using a similar equation: $100 \times (\exp(0.064) - 1) = 6.6\%$.

[395] See, for example, Cunningham, Scott, *Causal Inference: The Mixtape*, Yale University Press, 2021, available at https://mixtape.scunning.com/10-synthetic_control (last accessed July 25, 2024). This approach to measuring statistical significance accounts for the major form of uncertainty in this context, which is what economists call 'design-based uncertainty.'" See Rambachan, Ashesh and Jonathan Roth, "Design-Based Uncertainty for Quasi-Experiments," *Working Paper*, 2020, available at https://scholar.harvard.edu/sites/scholar.harvard.edu/files/jroth/files/DesignBasedQuasiExperiments.pdf (last accessed July 25, 2024).

[396] When using the 72-month data from January 2014 to December 2019, there are 48 (72 – 12 – 12) "placebo" effects using a 12-month bandwidth (i.e., 12 months of data on each side of the "placebo" threshold).

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defined a placebo disclosure to occur in the 13th month of that sample, just as it did in the
actual sample used in Column (1); and (iii) I estimated the effect of the "placebo" event,
along with the corresponding t-statistic.[397] Below each estimate in Table 3, I report the
fraction of t-statistics that are of equal or larger absolute magnitude than the *t*-statistic
corresponding to the estimate for the actual disclosure.[398] This is what economists and
statisticians often refer to as a two-sided empirical p-value.[399] It is the fraction of possible
estimates that are at least as extreme as the main estimate of interest. This method of
testing for statistical significance avoids false inferences.[400]

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[397] The *t*-statistic is the estimated ratio of the coefficient to the standard error for that coefficient. Economists
routinely employ *t*-statistics to test whether the estimated coefficients of regression equations are statistically
significant. See, e.g., Verbeek, Marno, *A Guide to Modern Econometrics*, Wiley, 5th ed. 2017, at pp. 20, 23-25.

[398] Research finds that randomization inference performs better in some settings when using *t*-statistics as the test
coefficient, rather than coefficients. See MacKinnon, James G. and Matthew D. Webb, "Randomization inference for
difference-in-differences with few treated clusters," *Journal of Econometrics*, Vol. 218, 2020, pp. 435-450, at 435
("We study two randomization inference (RI) procedures. A procedure based on estimated coefficients may be
unreliable when clusters are heterogeneous. A procedure based on *t*-statistics typically performs better (although by
no means perfectly) under the null, but at the cost of some power loss."); see also Feinstein, Steven and O. Miguel
Villanueva, "Securities Litigation Event Studies in the Covid Volatility Regime," *Journal of Forensic Economics*,
Vol. 31, No. 1, 2024, at 8-9 ("In this paper, we propose using the empirical distribution of daily stock return *t*-
statistics during the Covid period to identify the critical values for the statistical significance test. For any stock
during the Covid period, one can precisely find from the empirical distribution the 5% frequency *t*-statistic values and
use those values as the critical values to test for return significance. Event returns with *t*-statistics in the top 2.5% or
bottom 2.5% of the observed *t*-statistics are sufficiently unusual that one can reasonably deem them to be significant,
unlikely to have been merely random fluctuations.… We find that the methodology restores correct test size, i.e.,
eliminates spurious significance, while preserving substantial test power to identify the significant impact on stock
prices of earnings announcements in the Covid period."); Shea, John, "Union Contracts and the Life-
Cycle/Permanent-Income Hypothesis," *American Economic Review*, Vol. 85, No. 1, 1995, at 198. Results are similar
when using coefficients as the test statistic, rather than *t*-statistics. In particular, the empirical p-values corresponding
to estimates in Columns (1) – (8) of Table 3 are 0.729, 0.104, 0.423, 0.132, 0.5, 0.571, 0.95, and 0.625, respectively.

[399] See, e.g., Knijnenburg, Theo A., Lodewyk F.A. Wessels, Marcel J. T. Reinders, and Ilya Shmulevich, "Fewer
permutations, more accurate P-value," *Bioinformatics*, Vol. 25, No. 12, 2009, at i161 ("Permutation tests have
become a standard tool to assess the statistical significance of an event under investigation. The statistical
significance, as expressed in a *P*-value, is calculated as the fraction of permutation values that are at least as extreme
as the original statistic, which was derived from non-permuted data."); see also Brantingham, Jeffrey P., George
Mohler, and John MacDonald, "Changes in public-police cooperation following the murder of George Floyd," *PNAS
Nexus*, Vol. 1, No. 5, 2022, pp. 1-11; Carrell, Scott E., Bruce I. Sacerdote and James E. West, "From Natural
Variation to Optimal Policy? The Importance of Endogenous Peer Group Formation," *Econometrica* Vol. 81, No. 3,
2013, pp. 855-882; Bhargava, Saurabh and Ray Fisman, "Contrast Effects in Sequential Decisions: Evidence from
Speed Dating," *Review of Economics and Statistics*, Vol. 96, No. 3, 2014, pp. 444-457; Cattaneo, Matias D. and
Rocio Titiunik, "Regression Discontinuity Designs," *Annual Review of Economics*, Vol. 14, 2022, at 839.

[400] This fact is demonstrated by examining the frequency with which estimates from the permutations described
above are statistically significant when using standard errors from the standard regression. If a method of testing for
statistical significance is correct, then approximately 5% of "placebo" estimates should be statistically significant at
the 5% level. Instead, I find statistical significance rates are much too high, which indicates that method is incorrect.
For example, among estimates from the full set of possible permutations corresponding to the samples and
specifications shown in Columns (1) through (8) of Table 3 (i.e., those permutations used in the randomization

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200.   Economists usually consider p-values in excess of 5% or 10% as evidence that an estimate is not statistically different from zero (i.e., that the estimated effect is not statistically significant). Because none of the empirical p-values in Table 3 are smaller than 5 or even 10 percent—in fact, the smallest empirical p-value is 20.8 percent (in Column (2))—the estimates are not statistically significant.

201.   It is important to note that this statistical insignificance is also consistent with the lack of visually compelling discontinuities in Figure 4 at the time of the announcement and provides further evidence that the disclosure of RPO had no measurable impact on average CPMs in AdX. The results indicate that the world without the alleged deception about RPO would have been materially the same as the world with the alleged deception. For that reason, the evidence indicates that the alleged deception regarding RPO did not generate additional net revenue, or profits, for Google.

202.   I also performed two other tests to investigate whether advertisers "learned" to shade their bids in the months that followed the disclosure of RPO. In the first test, I used the same regression discontinuity design described above, except that I excluded the months immediately following the disclosure. In doing so, I allow advertisers to take up to four-and-a-half months following the disclosure to shade their bids, lowering CPMs.[401]

203.   As shown in Table 4, the results of this analysis do not find evidence that advertisers reduced their bids in the months that followed the announcement of RPO. Only two of the forty estimates are statistically significant at the 10% level, and none are significant at the 5% level.[402] Combined with the fact that estimates range from negative to positive, this

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inference approach I use) I find that 17%, 33%, 23%, 23%, 23%, 20%, 20%, and 8%, respectively, are statistically significant at the 5% level. Similarly, I find that 25%, 44%, 33%, 37%, 34%, 27%, 32%, and 27% are statistically significant at the 10% level. For a well-known example of a study that demonstrated this same problem in a different context, see Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, "How Much Should We Trust Difference-in-Differences Estimates?," *Quarterly Journal of Economics*, Vol. 119, No. 1, 2004, at 249 ("Most papers that employ Difference-in-Differences estimation (DD) use many years of data and focus on serially correlated outcomes but ignore that the resulting standard errors are inconsistent. To illustrate the severity of this issue, we randomly generate placebo laws in state-level data on female wages from the Current Population Survey. For each law, we use OLS to compute the DD estimate of its 'effect' as well as the standard error of this estimate. These conventional DD standard errors severely understate the standard deviation of the estimators: we find an 'effect' significant at the 5 percent level for up to 45 percent of the placebo interventions.").

[401] The "half" month refers to the fact that the disclosure occurred in mid-May 2016.

[402] I note that, when computing many estimates, chance alone makes it likely that some of the estimates will be statistically significant. For example, if one were to perform 10 independent statistical tests, one would expect one estimate to be statistically significant at the 10 percent level due to chance. This is what economists and statisticians

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indicates that there is no evidence that advertisers adjusted to the announcement in the subsequent months by reducing their bids. Again, this fact indicates that Google did not earn additional net revenue or profit because of the alleged deception about RPO.

Table 4
Estimated Shift in CPM from Google's Disclosure of RPO
With Potential Delay in Learning

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# of Months Included	24	24	20	20	16	16	12	8
Assumed Functional Form (Quadratic or Linear)	Quad.	Lin.	Quad.	Lin.	Quad.	Lin.	Lin.	Lin.
No Delay								
Estimated effect of disclosure	0.02	-0.09	0.06	-0.07	0.06	-0.02	0.01	0.02
P-value from a two-sided test of statistical significance (t-statistic based)	[0.813]	[0.208]	[0.404]	[0.25]	[0.554]	[0.589]	[0.95]	[0.453]
1 Month Delay								
Estimated effect of disclosure	0.03	-0.10	0.11	-0.09	0.15	-0.04	0.03	0.06
P-value from a two-sided test of statistical significance (t-statistic based)	[0.745]	[0.17]	[0.235]	[0.255]	[0.164]	[0.564]	[0.61]	[0.063]
2 Month Delay								
Estimated effect of disclosure	-0.02	-0.11	0.11	-0.12	0.13	-0.06	-0.01	0.09
P-value from a two-sided test of statistical significance (t-statistic based)	[0.783]	[0.152]	[0.22]	[0.14]	[0.389]	[0.481]	[0.828]	[0.129]
3 Month Delay								
Estimated effect of disclosure	-0.09	-0.12	0.07	-0.15	0.12	-0.10	-0.08	0.09
P-value from a two-sided test of statistical significance (t-statistic based)	[0.333]	[0.133]	[0.592]	[0.082]	[0.472]	[0.302]	[0.439]	[0.148]
4 Month Delay								
Estimated effect of disclosure	-0.14	-0.12	-0.02	-0.15	0.07	-0.13	-0.10	-0.01
P-value from a two-sided test of statistical significance (t-statistic based)	[0.295]	[0.227]	[0.813]	[0.146]	[0.731]	[0.173]	[0.357]	[0.967]

Notes: [1] The dependent variable is the natural log of CPM. [2] The test of statistical significance is the two-sided empirical p-value from a permutation test. [3] CPM is seasonally adjusted using data from 2014 to 2019. [4] Data are limited to U.S. users, Open Auctions, and exclude app, video, tv, ctv, game console, and "other" device type transactions. [5] May 2016 is excluded from the sample, since the mechanics of RPO were publicly disclosed midway through that month.
Source: AdX Data (GOOG-AT-MDL-DATA-000066537 - GOOG-AT-MDL-DATA-000481994)

204.   For the second test, I examine whether the rate of CPM change over time (rather than the level of CPM) declined following Google's disclosure of RPO, relative to the months before the disclosure. I do so based on the same linear fit specification I used for the regression discontinuity analysis in Table 3. The test asks whether the estimated "slope," or rate of monthly change in CPM, changed after Google disclosed RPO in May 2016.

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refer to as the problem of multiple inference, or multiple testing. See, e.g., Anderson, Michael L., "Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects," *Journal of the American Statistical Association*, Vol. 103, No. 484, 2008, pp. 1481-95.

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Evidence that this slope decreased following the disclosure would be consistent with the plaintiffs' theory of harm (that the disclosure led to shading). On the other hand, evidence that the slope did not change or increased is inconsistent with plaintiffs' theory and indicates Google did not profit from the alleged deception.

205.   Results are shown in Table 5. Estimates are small and range from negative 0.004 to 0.019. None of the estimates are statistically significant. Collectively, these results indicate there is no evidence that advertisers started shading following the disclosure of RPO.[403,404]

Table 5
Estimated Difference in the Rate of Change of CPM following Google's Disclosure of RPO
An Empirical test of whether learning resulted in a reduction in CPM

Model	(1)	(2)	(3)	(4)	(5)
# of Months included	24	20	16	12	8
Assumed Functional Form	Lin.	Lin.	Lin.	Lin.	Lin.
Estimated difference in time trend after the disclosure of RPO[1]	0.003	-0.003	-0.001	-0.004	0.019
P-value from a two-sided test of statistical significance (t-statistic based)[2]	[0.833]	[0.827]	[0.964]	[0.817]	[0.188]

Notes: [1] Estimates measure the change in the time trend (i.e., the rate of change or slope) of the natural log of CPM following the May 16, 2016 disclosure of the mechanics underlying RPO. [2] The test of statistical significance is the two-sided empirical p-value from a permutation test, which measures the fraction of possible t-statistics that are at least as extreme, in absolute value, as the t-statistic from the estimated effect of the actual May 16, 2016 disclosure. It comes from estimating "effects" of placebo policies using time periods of the same length throughout the full sample. To mirror the non-placebo regressions, the middle month is excluded from each regression. [3] Estimates come from the same specification as that used in Table 3. [4] Negative estimates are consistent with learning after the disclosure, as it suggests that bids and CPMs decline more after the disclosure than they did before the disclosure. [5] CPM is seasonally adjusted using data from 2014 to 2019. [6] Data are limited to US users, Open Auctions, and exclude app, video, tv, ctv, game console, and "other" device type transactions. [7] May 2016 is excluded from the sample, since the mechanics of RPO were publicly disclosed midway through that month.
Source: AdX Data (GOOG-AT-MDL-DATA-000066537 - GOOG-AT-MDL-DATA-000481994).

206.   In summary, the results above are inconsistent with the assertions made by the plaintiffs, Professor Weinberg, and Mr. Andrien. My results indicate that the disclosure of RPO did

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[403] The test of statistical significance is based on the same permutation-based approach as in Table 3, which is based on the fraction of possible t-statistics that are more extreme that the t-statistic of the actual estimate. The resulting empirical p-values are similar if the test is instead based on coefficients rather than t-statistics. The corresponding p-values for Columns (1) – (5) of Table 5 are 0.792, 0.788, 0.964, 0.8, and 0.484, respectively.

[404] The largest negative estimate—that is, the estimate that is most consistent with hypothesis that advertisers did not learn to shade until the months after the disclosure—is -0.004. Taken at face value, that estimate, which is not statistically different from zero, suggests that, following the disclosure of RPO, advertisers reduced their bids only 0.4 percent more per month than they did before. Thus, even that estimate is inconsistent with the plaintiffs' theory of harm.

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not cause a decline in advertiser bids and CPM.

207.   This conclusion is consistent with the analysis in Section II.B regarding how advertisers, their advertiser agencies, and their ad buying tools generally learn, evaluate performance, and determine how to adapt optimally to changes in the auction environment, and how they do so regardless of whether they know the details of optimization features. These the results are inconsistent with plaintiffs' theory that announcements or disclosures about optimization features are a primary driver of advertiser decision-making.

208.   For all of these reasons, I conclude that the alleged deception about RPO did not generate additional profit for Google. According to Mr. Andrien's framework, the absence of additional profit implies that the appropriate civil penalty for the alleged RPO-related deception is zero.

209.   Despite the evidence indicating that the alleged deception about RPO did not generate additional profit for Google, I also perform a second analysis that provides a conservative estimate of Google's incremental profits from the alleged deception. This analysis assumes (contrary to the evidence discussed above) that the alleged nondisclosure of RPO prevented advertisers from optimally adjusting their bidding behavior. As described in Appendix D, I estimate the degree to which advertisers would have shaded their bids absent the alleged deception about RPO and calculate that, under plaintiffs' theory, Google would have earned an additional $2,049,015 in profit in the plaintiff States as a result of the alleged deception about RPO. To be clear, I consider that amount to exceed any benefits that Google may have received from such alleged deception because it assumes that announcements relating to optimization features are a primary driver of advertiser behavior. That assumption is inconsistent both with how advertisers generally behave, as discussed in Section II.B, and with the evidence indicating that average CPM in AdX did not decline after the public disclosure of RPO.

B. Dynamic Revenue Sharing

210.   Prior to the introduction of sell-side Dynamic Revenue Sharing ("DRS") in August 2015, AdX generally kept as a "revenue share" approximately 20% of gross revenues (i.e., the

revenue it receives from bidders) for Open Auction transactions"[405] To win an AdX auction, a net bid (i.e., the advertiser's bid net of AdX's revenue share) had to exceed the other net bids in the auction, and it also had to exceed the reserve price.

211. It was possible for the highest bid in an AdX auction to exceed the reserve price on a gross basis, but fall below that reserve price on a net basis. In such situations, the high bidder would not win the impression, and the auction would not clear.[406] Suppose, for example, that the reserve price was $1.80 and the AdX revenue share was 20 percent. If the high bidder offered $2.00 for the impression, its net bid would be $1.60 (80 percent of $2.00) and the impression would not be sold because the highest net bid of $1.60 would fall below the $1.80 reserve price. For the AdX auction to clear, the high bid would need to be at least the reserve price divided by the portion of the revenue share going to the publisher (e.g., 80%).[407] In this example, the high bid would need to be at least $2.25 (= $1.80 / 0.80) to clear the reserve price.

212. Google introduced DRS to increase publishers' and Google's revenues, and to help advertisers bidding into AdX win more impressions, by dynamically changing the AdX revenue share to clear more AdX auctions.[408]

213. Google implemented three major versions of DRS, with each newer version replacing the earlier one.

- *DRS v1* was launched in August 2015 and "decreased Google's revenue share to grow revenue overall."[409] Google's reduced revenue share permitted more

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[405] Declaration of ███████, August 4, 2023, GOOG-AT-MDL-008842393 ("August 4, 2023 ███████ Declaration") at ¶ 29 ("Google's contracts with publishers specify how they will share revenue when AdX wins an impression. Up to at least December 2021, Google's standard rate was 20% of the clearing price in the AdX open auction. Prior to DRS, a publisher would receive the same, fixed revenue share on each impression that AdX won. With DRS, the AdX revenue share could change on a per-impression basis, as long as each publisher received at least their agreed-upon share of the revenue ███████ in aggregate over the contractual billing period.").

[406] Instead, the impression could be won by another DFP line item or go unsold.

[407] See, e.g., Weinberg Report at ¶ 190.

[408] See GOOG-DOJ-15130321 at -321 ("DRS is an optimization feature that increases publisher and Google revenue by dynamically changing the AdX sell-side revenue share so that more auctions end with a winning buyer.").

[409] GOOG-DOJ-15130321 at -321; see also Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, May 24, 2024, at 12 ("Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016. tDRS subsequently launched on or about July 17, 2018.").

net bids to exceed the reserve price and more auctions to clear.[410] DRS v1
could reduce the AdX revenue share to as low as zero.[411]

- Google launched *DRS v2* in December 2016.[412] With DRS v2, AdX
  "decreas[ed] and increas[ed] the Google share on different impressions, to
  increase the number of AdX auctions with a winning buyer while always
  achieving the publisher's contracted revenue share."[413] Testimony and internal
  Google documents indicate that DRS v2 made publishers better off, relative to
  a world without DRS.[414]

- Google launched *truthful DRS* ("tDRS") in July 2018.[415] While DRS v1 and
  DRS v2 adjusted AdX's revenue share after receiving buyers' bids, truthful
  DRS adjusted AdX's revenue share before sending bid requests to AdX
  buyers.[416] Although Mr. Andrien asserts that "certain aspects of tDRS were

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[410] To continue my earlier example, assuming that the reserve price was $1.80 and the high bid was $2.00 DRS v1 might reduce Google's revenue share to 10%, in which case the net bid would be $1.8 (i.e., $2 minus the revenue share of $0.20) so that: (i) the advertiser would pay $2.00 (i.e., its bid) and (ii) the publisher would receive $1.80 (i.e., the floor price).

[411] See Email from ▮▮▮▮▮▮▮▮ (Google), "Re: AdX Dynamic Revenue Share – requesting VP Launch Approval by email," December 4, 2014, GOOG-DOJ-13330569 at -572 ("DRS can clear queries in the larger 0-20% [AdX rev share] range."); August 4, 2023 ▮▮▮▮ Declaration at ¶ 31 ("In this initial version of DRS, the minimum revenue share applied was 0%.").

[412] See Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, May 24, 2024, at 12 ("Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016. tDRS subsequently launched on or about July 17, 2018.").

[413] GOOG-DOJ-04937543 at -543. Under DRS v2, the minimum revenue share applied was 0% and the maximum was 40%. AdX tracked the payments by each buyer to each publisher using "accounts" to ensure that, while the AdX revenue share applying to an individual impression could be higher or lower, AdX received its standard revenue share on average over all impressions for a given advertiser/publisher pair. See GOOG-DOJ-13207875 at –875, -879-881.

[414] See, e.g., August 4, 2023, ▮▮▮▮ Declaration at ¶ 33 (explaining that "[p]rior to launching DRS v2, Google conducted experiments ▮▮▮ A condition of launching DRS v2 was that it accomplish[ed] these benefits as opposed to solely shifting transactions from remnant line items (including header bidding line items) to AdX."); GOOG-DOJ-13235100 at -101-102 (showing that, compared to what would have occurred with "no-DRS", DRS v2 increased overall publisher revenues across AdX and other remnant inventory ▮▮ ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮).

[415] See GOOG-DOJ-15130321 at -321 (July 2018 update notes "We launched a new DRA model (tDRS)"); GOOG-DOJ-13949282 at tab "Q3Q4 2018", row 7 (AdX Truthful Dynamic Revenue Share launch date noted as July 17, 2018); see also Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, May 24, 2024, at 12 ("Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016. tDRS subsequently launched on or about July 17, 2018.").

[416] See GOOG-DOJ-15130321 at -321 ("With tDRS we determine Google's revenue share before seeing buyer bids.").

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misleading to publishers," [417] he does not propose any civil penalties related to tDRS.

214. The DRS program was discontinued once Google moved to a unified first price auction in September 2019.[418]

1. DRS v1

215. Relying on Professor Weinberg, Mr. Andrien contends that, with DRS v1, "AdX did not run a true second price auction."[419] Professor Weinberg opines that "DRSv1 is a dirty second-price auction" because, when DRS v1 lowered the AdX revenue share to clear an auction on AdX, "DRS v1 charges the highest bidder their bid."[420] Professor Weinberg also theorizes that (i) "[p]ublishers would have set different reserve prices to maximize their revenues had Google revealed DRS v1;"[421] and (ii) advertisers would have shaded (i.e., lowered) their bids "to maximize their payoffs had Google revealed DRS v1."[422]

216. However, neither Mr. Andrien nor Professor Weinberg considers the evidence of how advertisers and publishers actually behave. As described in Section II.B, as a general rule, both advertisers and publishers continually monitor performance and run experiments and other tests to optimize their strategies, often relying on other experienced intermediaries —such as advertising agencies, ad buying tools, and SSPs—to help them achieve the best results. Neither Mr. Andrien nor Professor Weinberg has provided any evidence that advertisers or publishers (or their intermediaries) focus on disclosed details about optimization features when developing and implementing their strategies.

217. As a result, the evidence indicates that advertisers, with assistance from their ad buying tools and advertising agencies, would have continued to monitor returns, perform tests,

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[417] See Andrien Report at ¶ 42.

[418] See GOOG-DOJ-14037639 at -641 ("For the first iteration [of the unified first price auction], DRS (dynamic revenue sharing) and RPO (reserve price optimization) is out of scope."); August 4, 2023 ▮▮▮ Declaration at ¶ 36 ("DRS was discontinued in September 2019, following the launch of the Unified First Price Auction.").

[419] Andrien Report at ¶ 38.

[420] Weinberg Report at ¶ 195.

[421] Weinberg Report at ¶ 219.

[422] Weinberg Report at ¶ 228 ("By not revealing DRSv1 to the advertisers, Google made material gains. This is because if advertisers were to shade their bids, which is the natural bidding behavior in a non-truthful auction like DRSv1, this would lead to less revenue for both AdX and publishers. However, advertisers likely did not shade their bids, since Google never publicly revealed DRSv1.").

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and optimize their strategies to maximize returns regardless of whether DRS v1 was disclosed. Moreover, if some advertisers were uninterested or unskilled at monitoring returns or optimally adapting, there is no evidence to suggest that such parties would respond with greater interest or skill to disclosures about DRS v1. Hence, advertisers' strategies in the actual world were likely similar to their strategies in the but-for world where DRS v1 was disclosed. Similarly, as described in Section II.B, regardless of whether DRS v1 was disclosed, publishers would monitor their returns and optimize their price floors based on the feedback they were constantly receiving as they participated in the auctions. Because both advertisers and publishers were likely engaging in the same strategies in both the actual and but-for worlds, Google's profits were likely the same in the actual and but-for worlds.

218. For this reason, I conclude that the alleged deception about DRS v1 did not generate additional profit for Google. According to Mr. Andrien's framework, the absence of additional profit due to the alleged deception implies that the appropriate civil penalty for the alleged deception about DRS v1 is zero.

219. Despite the evidence indicating that the alleged deception about DRS v1 did not generate additional profit for Google, I also perform a second analysis that provides a conservative estimate of Google's incremental profits from the alleged deception assuming (contrary to the evidence discussed above) that the alleged nondisclosure of DRS v1 prevented advertisers from optimally adjusting their bidding behavior. As described in Appendix D, I estimate the degree to which advertisers would have shaded their bids absent the alleged deception about DRS v1 and calculate that, under plaintiffs' theory, Google would have earned an additional $1,339,893 in profit in the plaintiff States as a result of the alleged deception about DRS v1.[423] To be clear, I consider that amount to exceed any benefits that

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[423] I assume, as does Mr. Andrien, that transactions from August 2015 to November 2016 would potentially be affected by the alleged deception about DRS v1. This range is conservative because Google disclosed DRS v1 on August 4, 2015, prior to the full launch of DRS v1 on August 20, 2015. See GOOG-AT-MDL-C-000035251 at -251 (Google Help Center post with filename of "web_152039_version_47_*2015-08-04*__11_33_52.pdf", explaining that "[t]he Ad Exchange auction closing price is determined as the greater of the second-highest net bid in the Ad Exchange auction or the reserve price applied to that impression. *In some cases, the auction may close at a price lower than the reserve price applied, due to auction optimizations.* Sellers are paid the Ad Exchange closing price, *net of Google's revenue share*, but will receive, subject to the terms governing their use of Ad Exchange, no less than the min CPM applied to the auction." (emphases added)); Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, Responses to Interrogatory No. 6 ("Dynamic Revenue Share launched on or about August 20, 2015.").

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Google may have received from such alleged deception because it assumes that announcements about optimization features are a primary driver of advertiser behavior. That assumption is inconsistent with how advertisers generally behave (as discussed in Section II.B).

2.   DRS v2

220.   Mr. Andrien asserts that the alleged deception concerning DRS v2 served to "mislead both advertisers and publishers regarding how much they are paying or paid out, prevented them from employing optimal bidding strategies, and obscured feedback to advertisers."[424] In doing so, Mr. Andrien relies on Professor Weinberg, who theorizes that, if Google had fully disclosed all aspects of DRS v2, then "no advertiser would bid in the dynamic region, and therefore DRS v2 would be equivalent to no DRS. That is, exactly the same advertisers would win exactly the same impressions and pay exactly the same amount and the entire DRSv2 program would be obviated."[425]

221.   In theorizing that advertisers would have bid differently if they knew all the details of DRS v2, Mr. Andrien and Professor Weinberg fail to acknowledge that, before launching DRS v2, Google disclosed that AdX revenue shares on any given transaction could be higher or lower than the contract rate.[426]

222.   That disclosure, combined with how advertisers generally monitor and optimize returns over time with help from their ad buying tools and advertising agencies, indicates that advertisers likely behaved the same way in the actual world as they would have behaved

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[424] Andrien Report at ¶ 42 ("I understand that some aspects of DRSv2 were misleading to advertisers and publishers based, in part, on Google's omissions in clearly disclosing the concept of debt with DRSv2, which mislead both advertisers and publishers regarding how much they are paying or paid out, prevented them from employing optimal bidding strategies, and obscured feedback to advertisers.").

[425] Weinberg Report at ¶ 226(a); see also *id.* at ¶ 226(b) ("[T]he best [advertisers] can do is to bid truthfully outside the dynamic region and avoid the dynamic region entirely."). Professor Weinberg does not appear to claim that the alleged deception about DRS v2 impacted publisher behavior. Moreover, his claim that, if disclosed, "DRSv2 program would be obviated," *id.* at ¶ 226(a), seems to suggest that he believes that disclosure would not have caused publishers to change how they set floor prices. See *id.* at ¶ 226(a).

[426] See GOOG-DOJ-14718514 at -514 ("We would like to allow AdX publishers to control whether they would like to use 1) fixed rev share on a per query basis or 2) dynamic rev share with average rev share at 80%. Opt-out control is a prerequisite for rolling out AdX dynamic rev share v2.… AdX publishers will be able to decide among a) opt out of dynamic rev share and use fixed Rev share 2) opt in dynamic rev share."); see also GOOG-DOJ-15130321 at -326 ("You may choose to opt-out of revenue share based optimizations in the AdX Ul. If you opt-out we will apply your contracted revenue share to every Open Auction query and you will not benefit from the increased revenue from this optimization.").

had Google disclosed even more details about DRS v2. Accordingly, there is no reason to believe that Google profited from the alleged deception about DRS v2. Therefore, under Mr. Andrien's framework, the appropriate civil penalty for such alleged deception is zero.

223. Despite the evidence indicating that the alleged deception about DRS v2 did not generate additional profit for Google, I also perform a second analysis that provides a conservative estimate of Google's incremental profits from the alleged deception assuming (contrary to the evidence discussed above) that the alleged nondisclosure of DRS v2 prevented advertisers from optimally adjusting their bidding behavior. [427] As described in Appendix D, I estimate the number of incremental transactions in the "dynamic region," which occur due to the alleged deception according to Professor's Weinberg theory. [428] I estimate that Google would have earned an additional $3,975,659 in profit in the plaintiff States as a result of the alleged deception about DRS v2. To be clear, I consider that amount to exceed any benefits that Google may have received from such alleged deception because it assumes that announcements about optimizations are a primary driver of advertiser behavior. That assumption is inconsistent with how advertisers generally behave (as discussed in Section II.B).

C. Project Bernanke

224. In late 2013, Google Ads implemented Project Bernanke ("Bernanke") to optimize its bids into AdX. [429] Bernanke reduced or dropped the second bid that Google Ads submitted into

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[427] Weinberg Report at ¶ 226(a) ("If all advertisers responded optimally to DRSv2, no advertiser would bid in the dynamic region, and therefore DRSv2 would be equivalent to no DRS" (original emphasis omitted)).

[428] Weinberg Report at ¶ 226(a) ("This increase in AdX revenue is only possible if transactions are cleared in the dynamic region, and every transaction cleared in the dynamic region necessarily involves an advertiser paying more than their value for an impression, and therefore suffering decreased payoff in comparison to no DRS.").

[429] GOOG-AT-MDL-009644018 at cell D2 ("Original Dynamic Revshare [buy-side DRS] launch was designed to reduce GDN buyside margin in AdX auctions ▮▮▮▮ down to potentially 0% to win more auctions. With this project, we are doing a little quantitative easing on the AdX, a la Bernanke … This is net-positive for GDN, GDN's advertisers, and publishers. GDN wins more auctions and generates more revenue at the same average ▮▮ revshare; GDN's advertisers win more auctions and get greater click/conversion volume; and AdX publishers enjoy higher match rate and revenue."); see also GOOG-DOJ-13469175 at -176 ("Project Bernanke involves reducing the second price and increasing the first price of the two bids submitted by GDN to the AdX auction in such a way that publishers receive fair payout [e.g., GDN margin remains constant] and GDN profit is maximized."). It is also worth noting that the Bernanke algorithm was calibrated using data that were available to other bidders into the AdX auction. *Id.* at -176 ("It is important to note that in this entire process, we only use information about the GDN bid and the GDN price paid on queries won by GDN. In other words, we do not use any AdX buyer information."); GOOG-DOJ-06842351 at -359 ("We respect GDN-AdX firewall: we only utilize GDN data to optimize bidding strategy. Any AdX buyer can do this.").

the AdX auction, which enabled Google Ads to reduce its payments to publishers for those impressions and then increase the top Google Ads bid on other impressions that it predicted were unlikely to otherwise clear.[430] These additional impressions created the possibility of additional clicks or other actions valued by advertisers. Bernanke was similar to programs used by other ad buying tools. [431]

225.   Under the initial version of Bernanke, which launched in November 2013,[432] Google Ads targeted an average revenue share on a per publisher basis.[433] In August 2015, Google launched Global Bernanke (also known as Bell v.1), which sought to maintain the same average margin across all publishers, while allowing that margin to vary for individual publishers.[434] In addition, between May 2016 and September 2019, a "truthful" version of Bernanke applied to Google Ads advertisers who were using autobidding.[435] Because that version of Bernanke was "truthful," advertisers using autobidding would have had no

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[430] GOOG-DOJ-13469175 ("Bernanke involves reducing the second price and increasing the first price of the two bids submitted by GDN to the AdX auction").

[431] ██

[432] See GOOG-AT-MDL-009644018 at cell C2.

[433] August 5, 2023 ████ Declaration at ¶ 9.

[434] August 5, 2023 ████ Declaration at ¶ 10.

[435] See GOOG-DOJ-AT-02467209 at -209 (indicating that the "truthful" version of Bernanke would "charge the minimum price needed to win the query. No change for non-CO ads. … We propose that for CO [Conversion Optimizer] advertisers (tCPA, fixed CPA, ROAS) gTrade should charge the minimum price to win the query, which makes the traffic look like regular second price auction.").

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incentive to modify their bids even if Bernanke had been disclosed to them.

226.   Mr. Andrien asserts that advertisers "would have shaded their bids in order to get higher
payoffs had they known about Projects Bernanke and Global Bernanke."[436] In doing so
Mr. Andrien relies on Professor Weinberg, who likewise contends that "[a]dvertisers
would have shaded their bids to maximize their payoff had they known about Projects
Bernanke and Global Bernanke."[437]

227.   Mr. Andrien also asserts that "all publishers likely would have changed their behavior had
they known about Projects Bernanke and Global Bernanke by raising their reserve prices
in order to maximize their revenue."[438] Again, in doing so, Mr. Andrien relies on
Professor Weinberg, who claims that "[p]ublishers would have raised their reserve prices
to maximize their revenue had they known about Projects Bernanke and Global
Bernanke."[439] Mr. Andrien's and Professor Weinberg's theory wrongly assumes that
Google Ads advertisers commonly bid on a CPM basis, when only a very small
percentage of those advertisers did so. In fact, ▮ percent of Google Ads advertisers bid on
a CPC or CPA basis.[440]Those advertisers relied on Google Ads to convert those bids into
CPM bids that AdX could compare to CPM bids from other buyers, and Bernanke did not
change that.[441] Furthermore, there is no evidence that advertisers knew the details of how
the conversion algorithm operated and used that knowledge to inform their bidding
strategies *before* Bernanke. As a result, there is no basis to assume that advertisers would
have altered their bidding strategies had Google disclosed Bernanke sooner and, thus, no
basis to conclude that Google's profit was higher in the actual world than it would have
been in the but-for world without the alleged deception about Bernanke.[442] It is far more

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[436] Andrien Report at ¶ 46.

[437] Weinberg Report at ¶ 258, heading for Section VIII.E 2.

[438] Andrien Report at ¶ 46.

[439] Weinberg Report at ¶ 248, heading 3, for Section VIII.C.3.

[440] Calculation based on Google Ads Dataset (for data sources and calculations, see workpaper "Google Ads
Impressions by Advertiser Payment Model.xlsx").

[441] See 30(b)(1) ▮▮▮ (Google) Deposition at 44:10-13, 45:12-16 ("Bernanke did not change how AdWords
charged advertisers. What changed was how we would bid into the AdX auction in order to further improve
advertiser value.… AdWords continued to charge advertisers based on the runner up, which -- which is what the
second-price auction that AdWords was running was doing prior to Bernanke too and it continued to even after
Bernanke was launched.").

[442] For the same reason, Bernanke could not have "caused advertisers to pay the price of the actual second-highest bid

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likely that, if Bernanke had been disclosed, Google Ads advertisers would have continued to rely on Google Ads to formulate optimal bids into AdX for them in the same way that they did in the actual world.

228. Even for the few Google Ads advertisers who bid on a CPM basis, Mr. Andrien's and Professor Weinberg's theory fails to account for the fact that, as a general matter and as described in Section II.B, advertisers and publishers learn over time by continually evaluating returns and performing experiments and optimizing accordingly. Moreover, economic reasoning indicates that, even if some advertisers or publishers were uninterested or unskilled at monitoring returns or optimally adapting, such parties would likely be just as uninterested or unskilled at monitoring and optimally responding to disclosures about Bernanke. As a result, advertisers and publishers likely responded to Bernanke in the actual world in the same way as they would have if Bernanke had been disclosed. This fact implies that Google was unlikely to have benefitted from the alleged deception about Bernanke and that the appropriate penalty under Mr. Andrien's framework would be zero.

229. Despite the evidence indicating that the alleged deception about Bernanke did not generate additional profit for Google, I also perform a second analysis that provides a conservative estimate of Google's incremental profits from the alleged deception assuming (contrary to the evidence discussed above) that the alleged nondisclosure of Bernanke prevented advertisers from optimally adjusting their bidding behavior. As described in Appendix D, I estimate the degree to which advertisers in the but-for world would have shaded their bids and calculate that, under plaintiffs' theory, Google would have earned an additional $14,359,456 in profit in the plaintiff States as a result of the alleged deception about Bernanke. To be clear, I consider that amount to exceed any benefits that Google may have received from such alleged deception because it assumes that announcements about

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instead of the third-highest bid" and could not have "deceived advertisers into paying the difference between the third and second highest bid directly into Google's pool." FAC ¶¶ 315, 553. Because the vast majority of Google Ads advertisers pay for actions, rather than impressions, the revenue share retained by Google Ads is calculated over the entire set of impressions that lead to a click rather than a single impression as posited by plaintiffs. See GOOG-AT-MDL-C-000009970 at -973 ("GDN … can not achieve 14% on every query because we pay per impression and receive revenue per click. Aim for 14% margin in expectation (over a set of queries)."). I am not aware of any evidence that Bernanke delivered clicks to advertisers in a way that did not meet the constraints imposed on the campaign by the advertiser, including the maximum cost per action such as CPC.

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optimizations are a primary driver of advertiser behavior. That assumption is inconsistent with how advertisers generally behave (as discussed in Section II.B).

D. Alchemist

230.   With Google's transition to a unified first price auction in the fall of 2019, Project Bernanke was replaced by a successor program known as "Alchemist" or "First Price Bernanke." Mr. Andrien asserts that "[u]nder First Price Bernanke, I understand that GDN continued to manipulate advertisers' bids before sending them to AdX."[443]

231.   As with alleged deception about the programs discussed above, in assessing whether Google benefitted from the alleged deception regarding Alchemist, it is important to consider the underlying economics regarding how advertisers and publishers behave. The evidence in Section II.B indicates that publishers and advertisers make decisions primarily by monitoring returns and adjusting and learning over time based on feedback from actual auctions, rather than by focusing on public announcements. As a result, there is no reason to believe that the behavior of the auction participants or the outcomes of auctions would be different if Google Ads had revealed it was using Alchemist or any similar bid optimization program.

232.   Moreover, Professor Weinberg acknowledges that one component of Alchemist is "a bid optimizer for GDN users that makes their participation in AdX's first-price auction truthful."[444] Professor Weinberg defines an auction as "truthful" if "each bidder receives the best possible outcome (given the other bidders' bids) by submitting a bid equal to their own value."[445] The "truthfulness" of Alchemist implies that, even if Google had disclosed Alchemist to Google Ads advertisers—and if advertisers focused on these disclosures, rather than on continually monitoring performance and optimizing—advertisers *still would have bid the same way as they did without the disclosure*. It follows that publishers would have no incentive to change their floors as a result of the disclosure.[446]

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[443] Andrien Report at ¶ 47.

[444] Weinberg Report at ¶ 266.

[445] Weinberg Report at ¶ 47.

[446] The logic for why Bernanke could lead publishers to raise their floors in the context of a second-price auction (i.e., to increase the clearing price when Google Ads' high bid wins and other bids are meaningfully lower) does not apply in the context of a first-price auction (where a bidder pays its own bid). As I discussed in Section II.B, publishers'

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233. Because neither advertiser nor publisher behavior depended on knowledge of Alchemist, the alleged deception about Alchemist did not increase Google's profits or otherwise benefit Google.

234. Moreover, neither Mr. Andrien nor Professor Weinberg has articulated a theory for, or provided empirical evidence of, how the alleged *deception* regarding Alchemist impacts auction participants. Instead, the evidence provided by Professor Weinberg indicates that Google Ads advertiser-, and by extension publisher-, behavior would be unaffected by the alleged deception. Because neither Mr. Andrien nor Professor Weinberg have articulated a theory for how Google could have benefitted from the alleged deception about Alchemist, they have provided no basis for assessing DTPA civil penalties for such alleged deception under Mr. Andrien's framework.

235. Similarly, neither Mr. Andrien nor Professor Weinberg has articulated a theory for, or provided empirical evidence of, how Alchemist is inconsistent with Google's so-called "equal footing" statement. In particular, neither Mr. Andrien nor Professor Weinberg has asserted that AdX treats bids coming into its auctions differentially because of Alchemist.

236. Because neither Mr. Andrien nor the plaintiffs have articulated a theory for why Alchemist is inconsistent with bidders being on "equal footing," they have provided no basis for assessing how Google could have benefitted from the alleged deception about AdX participants being on "equal footing" while Alchemist was in place.

237. For these reasons, Mr. Andrien has no basis to propose a non-zero DTPA civil penalty for the alleged deception about Alchemist.

E.   Facebook Network Bidding Agreement

238. The plaintiffs contend that, "[s]tarting at least as early as 2019, Google represented that all bidders in Google's exchange compete on an equal footing."[447] According to the plaintiffs, this statement was deceptive because Google's Network Bidding Agreement (NBA) with

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decisions about floor prices are inherently the result of a *data driven* process where floors are adapted to the *observed* bidding behavior of advertisers. As an illustration, I note that Google's RPO feature selected publisher-specific revenue maximizing floor prices using data on the bids on a publisher's inventory from the previous day. GOOG-DOJ-13199480 at -483. Plaintiffs have not demonstrated—or even claimed—that, had they known about Alchemist, publishers would have changed their floors in a way that would reduce Google's profit.

[447] FAC ¶ 586.

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Facebook[448] gave Facebook advantages that no other Open Bidder enjoyed.[449]
Specifically, the plaintiffs claim that, under the NBA, Facebook received several secret
advantages in Open Bidding auctions,[450] including (i) volume discounts[451]; (ii) longer
timeout periods[452]; (iii) the ability to pay publishers directly[453]; (iv) guaranteed match
rates[454]; and (v) assistance in detecting spam.[455] In addition, Mr. Andrien claims that the
NBA advantaged Facebook by (vi) granting it access to proprietary Google data.[456] Mr.
Andrien summarizes the plaintiffs' position by asserting that "Google provided Facebook
with advantages that were not available to other auction participants, and because of the
confidentiality of the NBA, such advantages were not disclosed to other participants."[457]
But neither Mr. Andrien nor Professor Weinberg explain or quantify how the alleged
deception about the NBA generated benefits to Google. Indeed, they do not provide any
evidence that the alleged advantages even existed.

239.   There are three primary reasons why Google's incremental net revenues and profits from
the alleged "equal footing" deception with respect to the NBA were zero.

240.   *First*, consider the number of U.S. web display transactions won by Facebook on Google's

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[448] This "Network Bidding Agreement" was executed on September 28, 2018. See GOOG-TEX-00144513 at -543.
Facebook's advertising monetization platform was formerly known as the Facebook Audience Network, or "FAN."
As the result of Facebook's rebranding as Meta in late 2021, FAN is now known as the Meta Audience Network. See,
e.g., "Introducing Meta Audience Network: New Name, Same Partnership with Publishers," *Meta Audience Network
Blog*, November 12, 2021, available at https://www.facebook.com/audiencenetwork/resources/blog/introducing-meta-
audience-network (last accessed July 25, 2024).

[449] FAC ¶¶ 588-597.

[450] FAC ¶ 590.

[451] FAC ¶ 428 ("Because auction winners are selected based on highest bid after fees, this special, Facebook-only
discount allows Facebook to win auctions even when it submits a lower gross bid than its competitors.").

[452] FAC ¶ 429 ("Google also provided Facebook with a speed advantage. Google subjects other marketplaces
competing for publishers' inventory in Exchange Bidding to 160 millisecond timeouts.… By comparison, Google
nearly doubled timeouts for Facebook, extending them to 300 milliseconds.").

[453] FAC ¶ 430 ("A third advantage was direct billing. Google further induced Facebook to help Google 'kill HB' by
letting Facebook have direct billing and contractual relationships with publishers. This term was advantageous to
Facebook because Google prohibits other exchanges and networks in Exchange Bidding from having such direct
relationships.… The inability to discuss pricing and terms constrains marketplaces' ability to operate and compete.
One advertising competitor compared Google's business term to a 'gag order.'").

[454] FAC ¶ 432 ("In the [NBA], Google promised to use 'commercially reasonable efforts' to help Facebook's network
recognize the identity of users in publishers' and developers' auctions.").

[455] FAC ¶ 592 ("[Google] provides Facebook information about impressions that are likely targeted to spam, giving
Facebook a leg up over competitors who are left paying for such fake and worthless impressions.").

[456] Andrien Report at ¶ 53.

[457] Andrien Report at ¶ 53.

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platform. This is the maximum number of auctions that could possibly have been won by Facebook as a result of the "secret" advantages purportedly created by the NBA.[458] Facebook won ▮ U.S. AdX Open Auction web transactions and ▮ U.S. Open Bidding web transactions, accounting for ▮ in advertiser spending (which is ▮ of AdX and Open Bidding web spending in any given month during that period).[459] As a result, even if one were to believe that the NBA gave Facebook advantages over other bidders, those advantages translated into, at most, ▮ ▮, some of which Facebook likely would have won even if the NBA had been disclosed earlier. This fact suggests that the alleged "advantages" were immaterial, which in turn indicates that neither Facebook nor other bidders would have behaved differently if the NBA had been made public. It follows, then, that Google's profits would be the same in the but-for world as they were in the actual world. As a result, applying Mr. Andrien's framework implies that the DTPA civil penalty for the alleged deception about the NBA would be zero.

241.   *Second*, as I explain in Section II.B., bidders continuously evaluate the performance of their strategies based on historical data and experiments and adjust their bids accordingly. As a result, any changes in advertiser bidding behavior due to the alleged advantages in the NBA would have occurred irrespective of whether the NBA was disclosed, and Google did not benefit from the alleged deception concerning the NBA. Thus, under Mr. Andrien's framework, the appropriate DTPA civil penalty for the alleged deception concerning the NBA would be zero.

242.   *Third*, the alleged advantages given to Facebook were not economically significant for the reasons described below. The absence of economically significant advantages means that behavior in the but-for world would have been the same as in the actual world, which in turn implies that Google did not benefit from the alleged deception. These facts imply that, under Mr. Andrien's framework, the appropriate DTPA civil penalty would be zero.

243.   *Volume Discounts.* The Fourth Amended Complaint incorrectly contends that the volume discounts specified in the NBA meant that Facebook won auctions even when bidding less

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[458] FAC ¶ 435 ("Google not only kept these special advantages for Facebook secret, but also continues to actively misrepresent the terms on which it conducts publishers' auctions.").

[459] Calculations implemented by "FAN.do".

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than other demand sources.[460] Executed in September 2018, the NBA provided that
Facebook would be charged a 10% revenue share on its first $500 million in spending per
year and then pay lower revenue share (5% instead of 10%) on additional spend, with this
threshold increasing to $375 million quarterly in September 2021.[461] But the agreement
was amended in January 2022 to remove the volume discount provision.[462] Even before
that amendment, Facebook never reached the spending thresholds in the original
agreement that would have qualified it for a volume discount. As a result, Facebook
always paid a 10% revenue share and never received any advantage from the volume
discount provisions of the NBA.[463]

244.   *Extended Timeout Periods.* The plaintiffs also contend that Google allowed Facebook a
        longer timeout period (the time within which a bidder must return a bid to participate in an
        auction) than it afforded to other bidders.[464] But the plaintiffs overlook that, in December
        2018 (i.e., three months after the NBA was executed and before Google made any
        statements about bidders being on an "equal footing"[465]), Google extended the bid timeout
        for mobile app inventory from 160 milliseconds to 300 milliseconds to *all* bidders,
        eliminating whatever advantage this provision may have given to Facebook for a brief

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[460] FAC ¶ 428 ("Because auction winners are selected based on highest bid after fees, this special, Facebook-only
discount allows Facebook to win auctions even when it submits a lower gross bid than its competitors.").

[461] More specifically, Facebook was required to pay a fee to Google equal to 10 percent of its Gross Spend in
connection with the NBA for its first $500 million of Gross Spend, and 5 percent of its Gross Spend after reaching
$500 million annual Gross Spend. GOOG-TEX-00144513 at -548. During Phase 3 of the agreement, which was set to
commence on the first day of the fourth year of the Term of the agreement, FAN could alternatively achieve the 5
percent rate tier by reaching a Gross Spend of $375 million in any quarter. See *id*. at -549 ("[I]n Phase 3, if
Facebook's Gross Spend is $375,000,000 in any Quarter, the next Quarter's Fee will be billed at a flat rate of 5% of
Gross Spend; however, if Facebook fails to spend $375,000,000 in the following Quarter, the next Quarter's Fee will
be billed at a flat rate of 10% of Gross Spend.").

[462] See GOOG-AT-MDL-B-007255353.

[463] Calculations based on the AdX Data (see Appendix H) and AdMob Data (GOOG-AT-DOJ-DATA-000000001).

[464] FAC ¶ 429 ("Google also provided Facebook with a speed advantage. Google subjects other marketplaces
competing for publishers' inventory in Exchange Bidding to 160 millisecond timeouts. Competitors have actively
complained that 160ms is not enough time to recognize users in auctions and return bids before they are excluded. By
comparison, Google nearly doubled timeouts for Facebook, extending them to 300 milliseconds. These longer
timeouts granted by Google were presumably designed to aid FAN in winning more auctions.").

[465] FAC at ¶¶ 586-587 ("Starting at least as early as 2019, Google represented that all bidders in Google's exchange
compete on an equal footing. For example, in the Google Ad Manager blog in March 2019, Google represented that it
was creating 'a fair and transparent market for everyone.' The representation remains visible and accessible on
Google's website today. Similarly, one of Google's webpages explaining how open bidding works (as captured in
April of 2020), represented that '[a]ll participants in the unified auction, including Ad Exchange and third-party
exchanges, compete equally for each impression.' That webpage continues to make the same claim today.").

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period.[466],[467]

245.   And when Google extended timeouts for all bidders, Facebook's share of in-app gross
       revenue transacted on AdX and AdMob was ▮▮▮▮▮▮▮,[468] meaning that any timeout
       advantage that Facebook might have achieved in the prior quarter was inconsequential.

246.   *Direct Billing*. The Fourth Amended Complaint alleges that the NBA benefitted Facebook
       by allowing it to "have direct billing and contractual relationships with publishers."[469]
       There is no economic basis for concluding that this purported advantage would have
       changed advertiser bidding behavior. As a result, there is no basis for an assertion that
       Google benefitted from the alleged deception. Moreover, it is not possible for any
       publisher to have been deceived about Facebook's direct billing because any publisher
       that used Facebook would know that it was being billed directly by Facebook.

247.   *Improved Match Rates*. The plaintiffs allege that, in the NBA, "Google promised to use
       "'commercially reasonable efforts' to help Facebook's network recognize the identity of
       users in publishers' and developers' auctions."[470] This provision ensured that Google
       would provide cookie matching services in connection with web transactions.[471]

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[466] See GOOG-DOJ-13220040 at -040. The reason for the extension was that other header bidding solutions gave
longer timeouts to bidders than Open Bidding gave to its bidders, placing Open Bidding at a competitive
disadvantage. See *ibid.* ("Our current RTB Timeout is 120ms for Authorized Buyers and 160ms for Exchange
Bidders. This puts us at a disadvantage, ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
▮▮▮▮▮▮▮▮▮▮▮▮▮▮ … For app in particular, where interstitials are usually pre-fetched and
cached, it makes the most sense to increase the deadline to something industry standard. With this launch, we will
increase all app traffic to 300ms for Authorized Buyers and Exchange Bidders.").

[467] While the launch did not apply to web inventory, as discussed above, Facebook bought very little web inventory
since November 2019, and it stopped buying web inventory altogether in April 2020. See "Facebook will shut down
Facebook Audience Network's mobile web arm," *Digiday*, February 5, 2020, available at
https://digiday.com/media/facebook-plans-shut-facebook-audience-networks-mobile-web-arm/ (last accessed July 25,
2024).

[468] ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ Calculations based on the AdX data (see Appendix H) and the
AdMob data (GOOG-AT-DOJ-DATA-000000001).

[469] FAC ¶ 430.

[470] FAC ¶ 432. In the NBA, Google committed to use commercially reasonable efforts to ensure an 80% match rate
for apps and 60% match rate on the Web. See GOOG-TEX-00144513 at -544. The NBA defines "Match Rate" as the
number of bid requests for which Facebook "recognizes the End User" (i.e., can match the request to the information
that Facebook has on users of its O&O properties), divided by the total number of bid requests that Google sends to
Facebook. See *ibid.* Plaintiffs allege that "Google provides Facebook an advantage in match rates, helping Facebook
recognize users more easily, and also provides Facebook information about impressions that are likely targeted to
spam, giving Facebook a leg up over competitors who are left paying for such fake and worthless impressions. Given
these advantages (as well as the other advantages provided to Facebook as described above), other participants are
not competing equally for each impression." FAC ¶ 592.

[471] See GOOG-AT-MDL-003595296 at -299 (noting that, when "FAN receives a bid request from Google" in "web,

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248.   As an initial matter, Mr. Andrien has not provided any evidence that Facebook received
any benefits from this provision over and above those received by other bidders. In theory,
an informational advantage for Facebook (if one existed) could give it a leg up over rival
bidders. But any such advantage would arise only in auctions where Facebook
participated, and Facebook has been bidding exclusively for in-app inventory since April
2020.[472]

249.   In the mobile app advertising environment, matching is performed through mobile
advertising IDs ("MAIDs") rather than cookies. As the UK Competition and Markets
Authority has explained, these "strings of alphanumeric characters assigned to mobile
devices … are a bedrock for personalized advertising on mobile, and are strong identifiers
in widespread use in the adtech ecosystem, playing a similar role to cookies (although
*there is no need to match them across apps because they are unique, device-wide
identifiers*)."[473] Therefore, because MAIDs— which provide matching information for
mobile app ads— are included in all Open Bidding requests[474] and because the NBA has
applied nearly exclusively to transactions for in-app advertising, Google's commitment to
ensure certain match rates had little practical effect (even if one were to assume, despite
the absence of evidence, that Facebook received an advantage in this respect over other
bidders).

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request contains hosted match data earlier stored by Facebook for the given user via cookie matching integration");

[472] Since April 11, 2020, FAN focuses on mobile apps and does not operate in the web space any longer. See
"Facebook will shut down Facebook Audience Network's mobile web arm," *Digiday*, February 5, 2020, available at
https://digiday.com/media/facebook-plans-shut-facebook-audience-networks-mobile-web-arm/ (last accessed July 25,
2024) ("Facebook is planning to shut down the mobile web arm of its Audience Network starting on April 11
[2020]");

[473] "Appendix G: the role of tracking in digital advertising," *Online platforms and digital advertising market study*,
United Kingdom Competition and Markets Authority, 2020, ("CMA Report"), available at
https://assets.publishing.service.gov.uk/media/5fe49554e90e0711ffe07d05/Appendix_G_-
_Tracking_and_PETS_v.16_non-confidential_WEB.pdf (last accessed July 25, 2024) at ¶¶ 32-33 (emphasis added).

[474] "Process the Request," *Google Authorized Buyers*, available at https://developers.google.com/authorized-
buyers/rtb/request-guide (last accessed July 25, 2024).

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250. *Spam Detection*. The Fourth Amended Complaint also contends that Google helped

Facebook recognize "which impressions are likely targeted to spam (e.g., impressions

targeted to bots, rather than humans). Facebook does not have to pay for such impressions.

Other networks have asked Google for the same information, but Google has refused. So

now Facebook has a further leg up over the competition in Google-run auctions: Facebook

knows which impressions sold through Google are fake and worthless."[475] Contrary to this

claim, it is my understanding that advertisers do not pay for impressions that Google

identifies as spam.[476] As a result, this is also not an advantage uniquely provided to

Facebook.

251. *Access to proprietary Google data*. Mr. Andrien alleges that Google "grant[ed] Facebook

access to proprietary Google data," but does not indicate the nature of these data.[477] His

only support for this allegation is a reference to a section of Professor Gans' expert report.

Like Mr. Andrien, Professor Gans fails to explain what this "proprietary data" was.[478]

252. Moreover, Mr. Andrien offers no explanation of how the purported transfer of unspecified

proprietary Google data to Facebook endowed the latter with advantages over other

market participants. He thus provides no reason to believe that this purported information

transfer violated Google's alleged "equal footing" commitments. Nor does he explain how

this purported information transfer could have altered the behavior of other auction

participants, or how it could have benefitted Google.

253. Finally, as noted earlier, Mr. Andrien contends that, "through the NBA, Google provided

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[475] FAC ¶ 431. The FAC leaves the impression that Google informs Facebook in real time which impressions are spam and which impressions are valid. This is contradicted by the language of the NBA, which provides that Google will "provide a mechanism that provides the other Party with (1) aggregate data that allows the other Party to validate billable impressions used to determine the amount to be paid to Publishers, with such reporting to be updated daily, and (2) the amount payable to Publishers." GOOG-TEX-00144513 at -530.

[476] See, e.g., Email from ▮▮▮▮▮▮ (Google), "Re: Offline Spam Cost Transparency Launch," June 3, 2020, GOOG-DOJ-AT-01509210 at -211 ("As has been mentioned previously, we have now launched offline spam cost transparency metrics in Query Tool. These metrics provide insight into spam credits granted to bidders via our offline pipeline. Bidders can use these metrics to reimburse their customers for spend that we deemed invalid.").

[477] See Andrien Report at ¶ 53.

[478] Gans Report at ¶ 874 ("As part of the NBA, Meta [then Facebook] was also granted direct remittance, meaning Meta would pay publishers directly, *along with access to proprietary Google data*, a guaranteed match rate for Meta, and malware identification for Meta, which gave Meta advantages that were not available to other auction participants and resulted in an uneven playing field in subsequent auctions." (emphasis added)). ▮▮▮▮▮▮

▮▮▮▮ *Id*. at ¶ 874 and footnote 1116.

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Facebook with advantages that were not available to other auction participants, and because of the confidentiality of the NBA, such advantages were not disclosed to other participants."[479] This claim does not suggest that the confidentiality of the NBA itself violated Google's alleged "equal footing" commitment. But even had Mr. Andrien alleged that the confidentiality of the NBA put bidders other than Facebook at a competitive disadvantage, he offers no explanation of why this might be the case or how this could have distorted auction outcomes.

254.   The foregoing analysis shows that any differences in the terms enjoyed by Facebook over other bidders due to the NBA were immaterial, and so could not have given meaningful advantages to Facebook in the auctions in which it participated. The lack of any material differences means that other firms would not have altered their behavior had they known about the so-called "advantages," and there is no evidence that Google benefited financially from the alleged "equal footing" deception regarding the NBA. As a result, under Mr. Andrien's framework, the appropriate DTPA civil penalty for that alleged deception would be zero.[480]

F. Mr. Andrien's Proposed Civil Penalties Vastly Exceed Google's Incremental Profit from the Alleged Deception

255.   Figure 5 summarizes Mr. Andrien's civil penalty estimates and my own. The first two bars show the lower and higher aggregate DTPA civil penalties proposed by Mr. Andrien, which are $7.2 billion and $21.8 billion, respectively. As described in Sections III, IV, and V, Mr. Andrien computes these penalties by multiplying his incorrect and inflated count of transactions by his arbitrary and inflated per-transaction penalties ranging from ███████ ██████████.

256.   As discussed in Section VI, the third bar in Figure 5 shows that, after partially correcting for Mr. Andrien's errors in transaction count and per-transaction penalties, the aggregate DTPA civil penalty is $141.3 million. The fourth bar shows that excluding from Mr.

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[479] Andrien Report at ¶ 53.

[480] ███████████████████████████████

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Andrien's count those transactions that could not have been affected by the alleged deception would further reduce the aggregate DTPA civil penalty to $44.9 million.

257.   As discussed in Section VII, Google likely did not benefit at all from any of the alleged deception, so under Mr. Andrien's framework, the aggregate DTPA civil penalty would be zero. As an alternative, assuming that advertisers in the but-for world would have responded as plaintiffs' experts theorize, I estimated the incremental profits that Google would have earned due to the alleged deception about RPO, DRS v1, DRS v2, and Bernanke to be $21.7 million,[481] which is represented by the fifth bar in Figure 5.

Figure 5
Mr. Andrien and Corrected Penalties
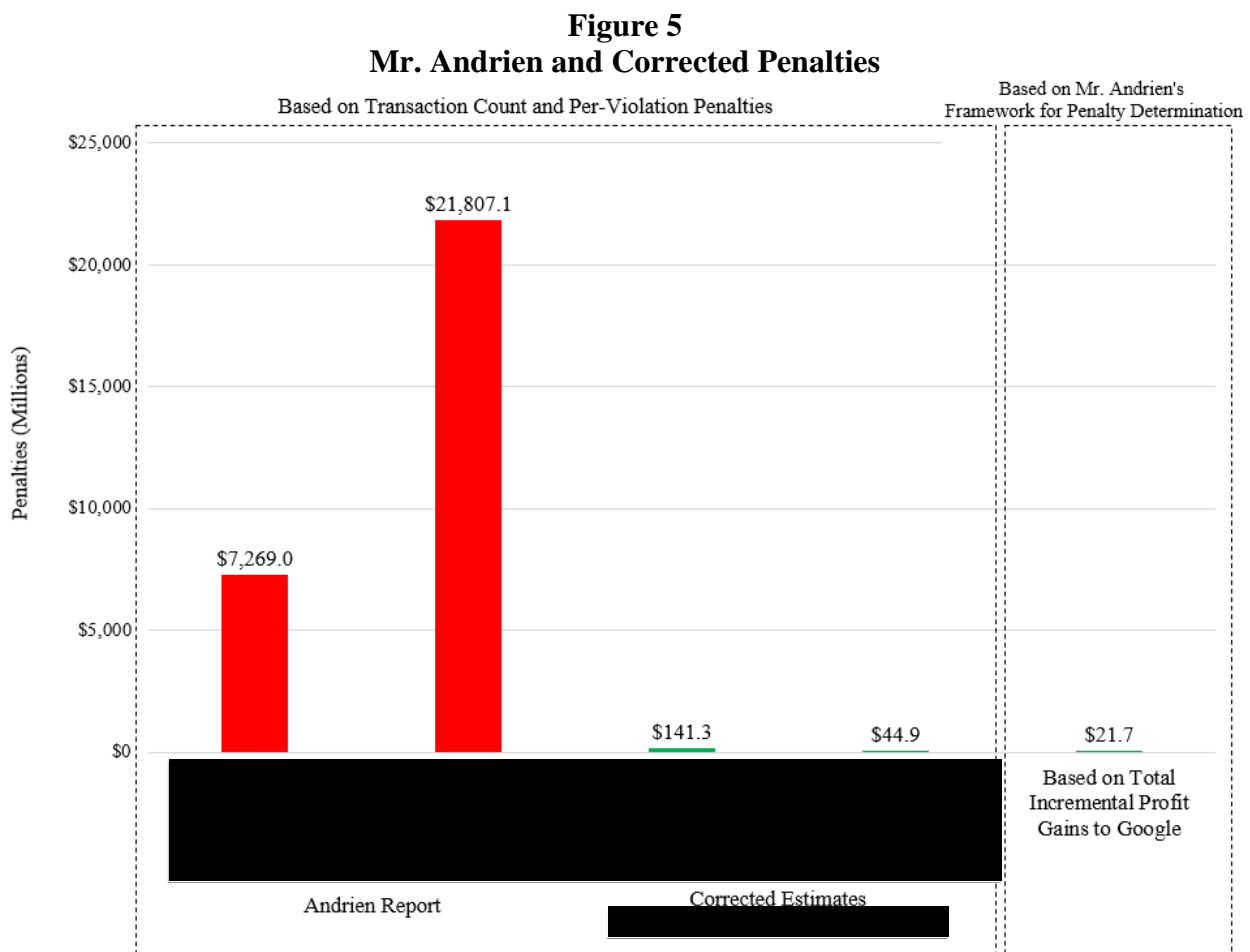
Notes & Sources: Andrien Report at Table 4; Table C3; Appendix D.

258.   The extraordinarily inflated penalties proposed by Mr. Andrien make the final three bars in Figure 5 difficult to see, so I present the same information from those three bars in

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[481] See Table D5.

Figure 6. That Figure underscores how significantly Mr. Andrien's calculations depart from his framework: while his framework would base DTPA civil penalties on the incremental benefits to Google from the alleged deception, the third bar shows that directly estimating those benefits implies far smaller penalties than Mr. Andrien's ad hoc calculations (shown in the first and second bars), even when those calculations are corrected for Mr. Andrien's numerous methodological errors.

Figure 6
Corrected Penalties
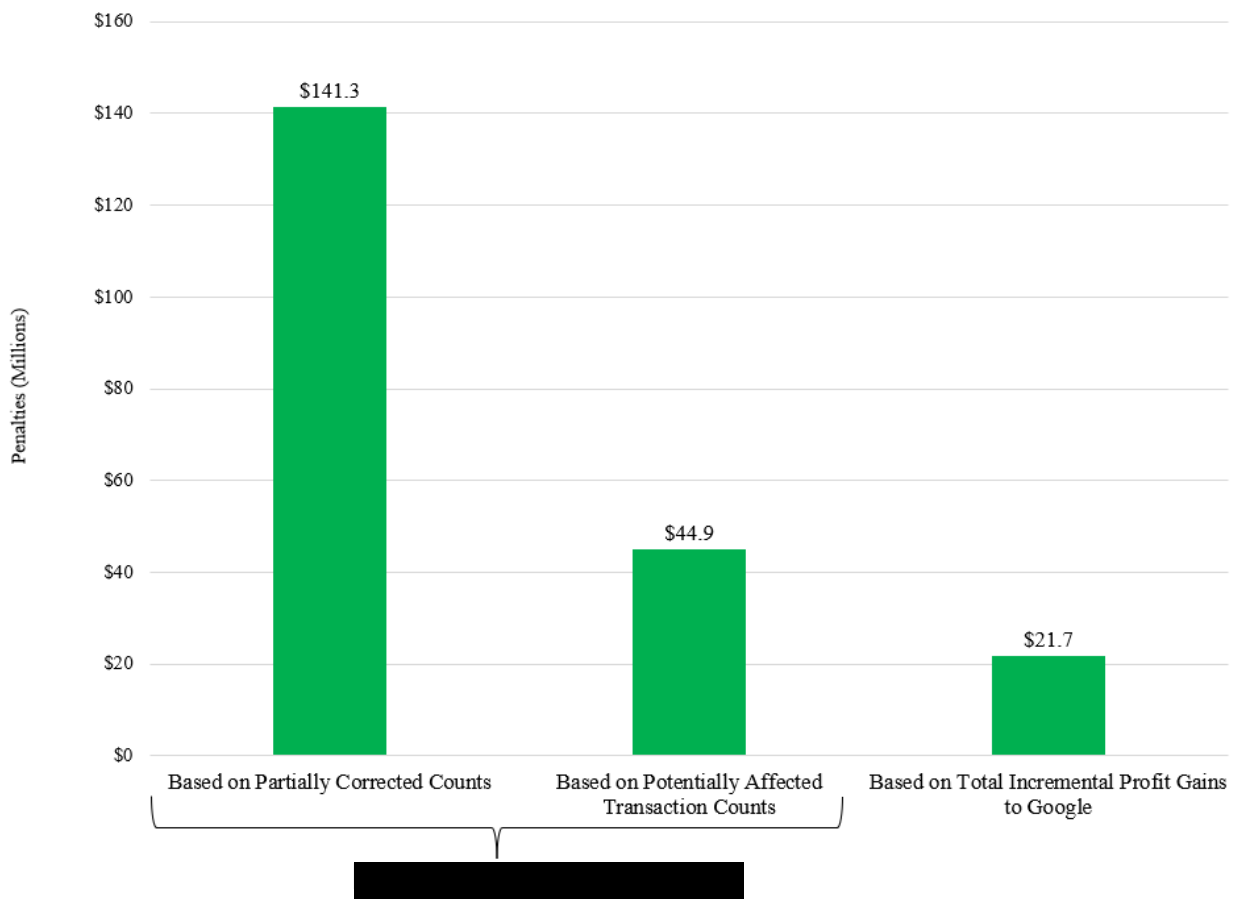
Notes & Sources: Table C3 and Appendix D.

VIII. Mr. Andrien's DTPA Analysis Suffers from Many Other Flaws

259. Mr. Andrien's framework for analyzing DTPA civil penalties focuses largely on the benefits that plaintiffs contend Google derived directly from the alleged deception. In addition to those direct benefits, Mr. Andrien postulates that Google benefited indirectly

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from the alleged deception.

260.   However, Mr. Andrien makes no effort to estimate the magnitude of these purported indirect benefits to Google, or even to demonstrate that they are significant. Nor does he provide any reason to believe that Google indirectly benefited from the alleged deception concerning the programs at issue, as distinguished from any indirect benefits Google may have received from the operation of the programs themselves.

261.   Mr. Andrien also discusses measures of Google's financial performance and claims that Google has a "history of previous violations."[482] In offering his opinions on these topics, Mr. Andrien makes analytical mistakes and mischaracterizes the evidence on which he relies.

A. There Are No Indirect Benefits to Google That Would Justify Higher DTPA Civil Penalties

262.   Mr. Andrien asserts that Google's allegedly deceptive practices could provide it with three indirect benefits.[483] As I describe below, none of these indirect effects is supported by facts or economic logic.

263.   *First*, Mr. Andrien asserts that the alleged deception allowed Google to "obtain[] funds that can be used for additional employees, to improve their technology, or to improve its relative position in the industry, including by funding acquisitions."[484] Mr. Andrien provides no evidence that Google funded acquisitions using profits derived from the alleged deception discussed in his report. The only acquisitions he cites (the 2008 DoubleClick acquisition, and Google's purchases of Invite Media and Admeld in 2010 and 2011[485]) occurred long before the alleged deception. As he explains, the first version of Bernanke was launched in November 2013[486]; RPO was launched in March/April 2015[487]; the first version of DRS was launched in August 2015[488]; and the "equal footing"

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[482] Andrien Report at ¶¶ 124-126.

[483] Andrien Report at ¶¶ 111-115.

[484] Andrien Report at ¶ 111.

[485] Andrien Report at ¶ 113.

[486] Andrien Report at ¶ 44.

[487] Andrien Report at ¶ 31.

[488] Andrien Report at ¶ 37. Mr. Andrien contends also that " ▮▮ *Ibid.*

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misrepresentation allegedly occurred in 2019.[489] Because the alleged deception began after the three cited acquisitions were consummated, it could not have generated funding for those acquisitions. Moreover, as a matter of economics, Google will hire additional employees and invest in additional technology, when the marginal benefits of doing so exceed the marginal costs.[490] Mr. Andrien offers no evidence that the alleged deception impacted Google's marginal benefits or costs of investing in employees and technology or impacted its ability to make such investments. And my own analysis in Section VII suggests that, even under plaintiffs' theory, the alleged deception generated sufficiently modest incremental profits that it likely did *not* enhance Google's ability to invest in employees and technology.

264.   *Second*, Mr. Andrien posits that the "benefit to Google from RPO, DRS and Project Bernanke could include increased AdX win rates and revenue," generating "indirect network effects" that serve as barriers to entry against competitors.[491] By its own terms, this claim does not relate to the alleged *deception*; it relates only to Google's optimizations, which (by themselves) are not alleged to violate the plaintiff States' DTPAs.

265.   Mr. Andrien's arguments with regard to indirect network effects also disregard how firms learn from market signals and respond to such learning. As I explain in Section II.B., advertisers and publishers rely on readily available return metrics and the advice of advertising agencies and other sophisticated intermediaries to determine which ad tech platforms to use. They also multi-home, which both facilitates comparisons of returns across platforms and reduces or even eliminates switching costs. This multi-homing enables advertisers and publishers to move business toward rivals' platforms when they offer higher returns than Google, which subjects Google to competitive pressure irrespective of past events. At any point in time, therefore, Google's success rests on

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[489] Mr. Andrien states that Google has made its allegedly deceptive "equal footing" representation "since at least 2019." Andrien Report at ¶ 51.

[490] See, e.g., Mankiw, N. Gregory, *Principles of Microeconomics*, Cengage Learning, 5th ed. 2008, at 294 ("If marginal revenue is greater than marginal cost, the firm should increase its output. If marginal cost is greater than marginal revenue, the firm should decrease its output. At the profit-maximizing level of output, marginal revenue and marginal cost are exactly equal."). Marginal revenue and costs are the incremental revenue and costs associated with a specific decision a firm can make (e.g., hire additional employees).

[491] Andrien Report at ¶ 113.

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continuing to provide high returns to advertisers and publishers, not on past market conditions as Mr. Andrien supposes.

266.   *Third*, Mr. Andrien argues that the alleged deception "further[s]" Google's "monopoly position" and "reinforces" alleged antitrust violations,[492] concluding that the "deceptive misconduct alleged in this matter is properly viewed as part of an overall scheme by Google to dominate and maintain its place in the display advertising industry."[493] Such an argument is incorrect. As I discuss in Section II.B and Section VII, because of advertiser and publisher learning and experimentation the alleged deception was unlikely to impact auction outcomes. As a result, the alleged deception was also unlikely to have any ability to "further" any alleged "monopoly position" or "reinforce" any alleged antitrust misconduct. Furthermore, as I discuss in Section VII and Appendix D, even under plaintiffs' theories the impact of the alleged deception is limited, and thus unlikely to materially impact Google's ability "to dominate and maintain its place in the display advertising industry."

B. Measures of Google's Overall Financial Performance Are Not Relevant for Assessing Penalties Related to the Alleged Deception

267.   Mr. Andrien asserts that Google's financial performance "is pertinent to [his] opinion as it establishes Google as [a] highly profitable and successful company during the relevant period and informs the amount necessary to deter Google's misconduct and its ability to pay a penalty related to this misconduct."[494] He also contends that Google's financial performance has been driven primarily by the success of its advertising business.[495]

268.   Mr. Andrien's assertion that Google's overall financial performance is relevant to assessing civil penalties rests on two basic economic mistakes.

269.   *First*, Mr. Andrien ignores the fundamental economic concept that profit maximizing

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[492] Andrien Report at ¶ 114.

[493] Andrien Report at ¶ 115.

[494] Andrien Report at ¶ 77.

[495] See Andrien Report at ¶¶ 86-90 (describing how "Google's financial reports demonstrate that its success is driven primarily by advertising" as a general matter, i.e., where "advertising" is not limited to display advertising). While he purports to assess the performance of Google's "overall display advertising revenue and profit" by reference to profit and loss data for Google's "Display, Video, Apps, and Analytics" ("DVAA") product segment, Mr. Andrien does not assert that Google's display advertising business is a significant driver of the company's financial performance. See *id.* at ¶¶ 91-95.

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firms make decisions on the margin.[496] That is, firms compare the incremental benefits
and costs associated with the various possible decisions they can make. Marginal decision
making means that the total profits of a firm, its revenue, its cash and short-term
investments, or even its market capitalization are not driving factors in the decisions it
makes. Instead, decisions are determined based on whether the marginal benefits exceed
the marginal costs of undertaking an action.[497] As a result, Google's overall financial
performance is largely irrelevant.

270.   *Second*, most of Google's profits come from business activities (such as search
advertising) other than display advertising, much less the alleged deception about the
specific display-advertising practices at issue in this case. Under Mr. Andrien's
framework, penalties should be designed to "eliminate Google's financial incentive to
engage in the misconduct."[498] But while Mr. Andrien describes the trajectory of various
measures of Google's financial performance, including its total assets,[499] total market
capitalization and share price (i.e., its total market capitalization divided by the numbers
of shares outstanding),[500] total revenue and total operating profit,[501] and total operating
profit from advertising,[502] he fails to link these to the alleged deception at issue.[503] For
example, Mr. Andrien cites Google's 2023 SEC Form 10-K and highlights that Google
earned $307.394 billion in revenue in 2023,[504] but the 10-K reports that Google's total

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[496] See, e.g., Mankiw, N. Gregory, *Principles of Microeconomics*, Cengage Learning, 5th ed. 2008, at 294.

[497] Before taking costs into account, the marginal benefit to a firm of undertaking an action is its marginal revenue from that action. In order to maximize its profits, a profit-maximizing firm will choose the level of its activity at the level that causes this marginal benefit to equal its marginal cost from the activity. See, e.g., Mankiw, N. Gregory, Principles of Microeconomics, 5th ed. 2008, at 294 ("If marginal revenue is greater than marginal cost, the firm should increase its output. If marginal cost is greater than marginal revenue, the firm should decrease its output. At the profit-maximizing level of output, marginal revenue and marginal cost are exactly equal.").

[498] Andrien Report at ¶ 11(f) ("To deter Google from continuing its misconduct, the penalty must eliminate Google's financial incentive to engage in the misconduct.").

[499] Andrien Report at ¶ 81.

[500] Andrien Report at ¶¶ 82-85.

[501] Andrien Report at ¶¶ 78-79.

[502] Andrien Report at ¶¶ 87-90.

[503] Mr. Andrien explicitly indicates that he was unable to quantify the benefits to Google of the alleged deception, which implies that he was unable to ascertain whether or to what extent such deception affected Google's financial performance. See Andrien Report at ¶¶ 116-118.

[504] See Andrien Report at ¶ 78 and footnote 214.

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advertising revenue was $237.855 billion in 2023,[505] of which $175.033 billion came from its "Google Search and other properties" line of business.[506] By contrast, $31.312 billion in revenue[507]—representing 10.2 percent of Google's total revenue[508]—came from Google Network, the line of business that includes the products at issue in this case (as well as other products).[509]

C. Google Does Not Have a History of Violating DTPAs

271.   Mr. Andrien argues that Google's past history of paying fines and entering into settlements should be taken into account when setting penalties for Google's alleged DTPA violations in this case.[510]

272.   In support of that argument, Mr. Andrien relies primarily on what he claims to be a complaint prepared by the Federal Trade Commission, asserting that "[i]n its May 2023 complaint, the FTC counts Google fines and settlements of over $12 billion from 2011 to 2023."[511] Mr. Andrien misinterprets this document, which appears to be a piece of advocacy prepared by Oracle Corporation, one of Google's many competitors,[512] and submitted to the FTC to encourage regulatory action against Google.[513] Contrary to Mr.

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[505] Alphabet Inc. Form 10-K for the fiscal year ended December 31, 2023, *Alphabet Investor Relations*, 2024, at 35, available at https://abc.xyz/assets/43/44/675b83d7455885c4615d848d52a4/goog-10-k-2023.pdf (last accessed July 26, 2024).

[506] *Id.* at 35.

[507] *Ibid.*

[508] Calculated as $31.312 billion / $307.394 billion.

[509] Alphabet Inc. Form 10-K for the fiscal year ended December 31, 2023, *Alphabet Investor Relations*, 2024, at 31, available at https://abc.xyz/assets/43/44/675b83d7455885c4615d848d52a4/goog-10-k-2023.pdf (last accessed July 26, 2024) ("Google Network … includes revenues generated on Google Network properties participating in AdMob, AdSense, and Google Ad Manager.").

[510] Andrien Report at ¶¶ 124-126.

[511] Andrien Report at ¶ 125.

[512] See "Why Oracle Cloud Infrastructure over Google Cloud Platform," *Oracle*, available at https://www.oracle.com/cloud/oci-vs-google-cloud/ (last accessed July 25, 2024).

[513] This purported "FTC complaint" is replete with evidence that it is in fact not an FTC complaint but is an advocacy document submitted by Oracle. For example, its cover page reads, "Submitted by: Kenneth Glueck, Executive Vice President, Oracle America, Inc., 901 F Street NW, Suite 800, Washington, DC 20004," while its Introduction and Summary argues that "the Federal Trade Commission ('Commission') *should* initiate an investigation [of] . . . Google." See Oracle Corporation, "Draft Complaint In the Matter of Alphabet, Inc.," May 8, 2023, at cover page and 1. The public record affirms that Oracle has been active in encouraging enforcers to bring actions against Google. See Nix, Naomi, "Oracle's Hidden Hand is Behind the Google Antitrust Lawsuits," *Los Angeles Times*, December 24, 2020, available at https://www.latimes.com/business/story/2020-12-24/oracle-google-antitrust-lawsuits (last accessed July 25, 2024).

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Andrien's claim, it is not a document filed by the FTC against Google.

273.   My own analysis of the $17 billion in settlements and fines listed in the Oracle document, as well as two other matters cited by Mr. Andrien,[514] is summarized in Table 6. That analysis reveals that, contrary to Mr. Andrien's claims, Google does not have a history of engaging in conduct similar to the deception alleged in this case.

Table 6
Summary of Settlement Payments and Fines Relied Upon by Mr. Andrien

	Worldwide			U.S. Only		
	Total	Settlements	Fines + Sanctions	Total	Settlements	Fines + Sanctions
Total Settlement and Fines paid	$16,965,789,361	$6,667,592,670	$10,298,196,691	$6,392,466,374	$6,391,390,659	$1,075,715
Claims similar to the deceptive conduct alleged in this case	$0	$0	$0	$0	$0	$0
Other claims (e.g., privacy, antitrust)	$16,965,789,361	6,667,592,670.0	$10,298,196,691	$6,392,466,374	$6,391,390,659	$1,075,715

Notes: [1] Calculations include cases cited in the Oracle draft complaint and cases which are not listed in the Oracle draft complaint but are referred to by Mr. Andrien. See Andrien Report at ¶ 125 and footnotes 310-312. [2] U.S. totals are driven largely by one case where plaintiffs estimated the "value" of agreed injunctive relief was $5 billion, while Google disputed plaintiffs' "legal and factual characterizations." See Plaintiffs' Unopposed Motion for Final Approval of Class Action Settlement at 3 and footnote 2, *Brown et al. v. Google LLC*, No. 4:20-cv-03664 (N.D. Cal. April 1, 2024), ECF No. 1096.
Sources: See Table G1 in Appendix G.

274.   *First*, most of the $17 billion in settlements and fines was incurred in connection with matters arising outside of the United States. This is reflected in the first row of Table 6, which indicates that nearly two-thirds of the total amount was to parties outside the U.S.[515] Mr. Andrien has made no effort to show that the legal authorities under which those settlements or fines were paid are similar to the plaintiff States' DTPAs. Nor has he shown any similarity between the conduct to which those settlements or fines relate and the alleged deception on which plaintiff States' DTPA claims are based.

275.   *Second*, nearly all of the $6.4 billion related to U.S. matters were settlements, rather than fines or other sanctions. The first row of Table 6 shows that only $1.1 million, or 0.017%

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[514] See Andrien Report at ¶ 125.

[515] ($16,966,289,361 - $6,392,966,374)/ $16,966,289,361 = 62.3%.

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of the $6.4 billion, was paid to a U.S. party as a fine or other sanction.[516] This fact is important because I understand that none of the U.S. privacy settlements cited by Mr. Andrien involved determinations or admissions of liability.[517] Thus, there is no basis for asserting that any of these settlements were consequences of illegal conduct by Google. These settlements could just as easily be explained as efforts to avoid the costs and uncertainties of litigation and the associated distractions of executives who are more usefully employed in running Google's business. Such settlement amounts do not indicate that Google has engaged in any misconduct, much less a similar type of misconduct to what is at issue in this case.

276. *Third,* none of the $17 billion in worldwide settlements and fines related to conduct similar to the deception alleged in this matter. This fact is shown in the second and third rows of Table 6. In fact, as shown in the third column of Table G1 in Appendix G, most of the settlements are related to alleged consumer privacy or antitrust violations, neither of which is conduct for which Mr. Andrien has proposed civil penalties.[518]

277. *Fourth,* Mr. Andrien's assertion that settlements and fines—including for unrelated behavior—are relevant in assessing civil penalties is inconsistent with his own framework for assessing penalties. As noted earlier, Mr. Andrien's framework for determining the appropriate penalty is to "eliminate Google's financial incentive to engage in the misconduct."[519] This framework is fundamentally inconsistent with using past settlements for unrelated conduct to justify inflating penalties.

278. *Finally*, Mr. Andrien claims that incurring more than $12 billion in fines and settlements

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[516] Of this $6.4 billion in U.S. settlements, $5 billion is attributable to the "value" that plaintiffs in one case attributed to injunctive relief (i.e., not a cash penalty). See Plaintiffs' Unopposed Motion for Final Approval of Class Action Settlement at 3, *Brown et al. v. Google LLC*, No. 4:20-cv-03664 (N.D. Cal. April 1, 2024), ECF No. 1096. Although Google did not oppose settlement, it disputed "the legal and factual characterizations" contained in plaintiffs' motion. See *id.* at 3, footnote 2.

[517] These settlements are listed in Table G1 Sources [32]-[34], [36], [38], [40]-[44], and [47-48].
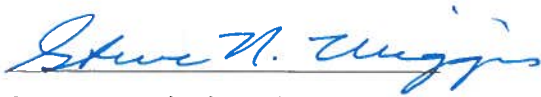
[518] I understand that the only payment for a claim bearing any similarity to the ones in this case was a $155 million settlement related to the improper use of location data for advertising and was brought under California's Unfair Competition Law and False Advertising. See Stempel, Jonathan, "Google to pay $155 Million in Settlements Over Location Tracking," *Reuters*, September 15, 2013, available at https://www.reuters.com/legal/google-pay-155-million-settlements-over-location-tracking-2023-09-15/ (last accessed July 25, 2024). However, even this amount has no logical connection to Mr. Andrien's analysis because Mr. Andrien did not base his proposed DTPA civil penalties on alleged violations of consumer privacy.

[519] Andrien Report at ¶ 11(f).
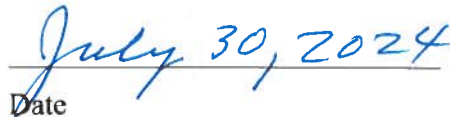
was not "detrimental to Google."[520] That is wrong as a matter of economics. Standard economic analysis recognizes that firms seek to maximize their profits.[521] Because every settlement and fine reduced Google's profits, each was, by definition "detrimental."

Respectfully submitted,

Steven N. Wiggins, Ph.D.

July 30, 2024
Date

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[520] Andrien Report at ¶ 126.

[521] See, e.g., Henderson, James M. and Richard E. Quandt, *Microeconomic Theory: A Mathematical Approach*, McGraw-Hill Book Company, Inc., 3rd ed. 1980, at 78-79.

Appendix A: Curriculum Vitae

STEVEN N. WIGGINS

ADDRESS:

EDUCATION:

Massachusetts Institute of Technology, Ph.D., 1979
Oklahoma State University, B.A., 1975

PROFESSIONAL EXPERIENCE:

Senior Consultant, Charles River Associates, 2000 - present
Senior Consultant, LECG, 1996 – 2000
Professor Emeritus of Economics, Texas A&M University, 2022 - present
Professor of Economics, Texas A&M University, 1991 - 2021
Associate Professor of Economics, Texas A&M University, 1984 - 1991
Assistant Professor of Economics, Texas A&M University, 1979 - 1984

HONORS AND AWARDS:

Distinguished Achievement Award for Teaching, College Level, Association of Former Students, Texas A&M University, 2017.
Dr. Dennis Berthold Innovations in Teaching Endowment Award, College of Liberal Arts, Texas A&M University, 2017.
Jeff Edwardson Outstanding Undergraduate Teaching Award, Department of Economics, Texas A&M, 2016.
Thunderbird Award, Business Association of Latin American Studies, Barcelona, Spain, 2010.
George and Mary Jordan Professor of Economics and Public Policy, Texas A&M University, 1993 - 1998.
Rex B. Grey Professor, Private Enterprise Research Center, Texas A&M University, 1986 - 1989.
Visiting Distinguished Lecturer on American Economic Institutions, Johann Wolfgang Goethe University, Frankfurt am Main, May - July 1988.
University Teacher/Scholar, Texas A&M Honors Program, 1986-87.
Visiting Distinguished Lecturer on Economic Institutions Professor, University of the Saarlands, Saarbrucken, West Germany, May - August 1984.

DISSERTATION TITLE:

Product Quality Regulation and Innovation in the Pharmaceutical Industry

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RESEARCH INTERESTS:

Industrial Organization, Regulation, and Antitrust

LAST TEN YEARS OF DEPOSITION AND TRIAL TESTIMONY:

2024   Converge Midstream, L.L.C. v. Magellan Crude Oil Pipeline Company, L.P. and
              Magellan Midstream Partners, L.P. Cause No. 2022-26294, District Court, Harris
              County, Texas, 113th Judicial District
              Deposition

2023   IN RE: Little River Healthcare Holdings, LLC, et al., Case No. 18-60526-rbk, United
              States Bankruptcy Court, Western District of Texas, Waco Division
              Deposition

2022   IN RE: Broiler Chicken Antitrust Litigation, MDL Docket No. 1:16-CV-08637, United
              States District Court, Northern District of Illinois, Eastern Division
              Deposition

2019   IN RE: EpiPen (Epinephrine Injection, USP) Marketing, Sales Practices and Antitrust
              Litigation, MDL No. 2785, Case No. 17-md-2785-DDC-TJJ, United States
              District Court for the District of Kansas
              Deposition

2018   Academy of Allergy & Asthma in Primary Care and United Biologics, LLC D/B/A United
              Allergy Services. v. American Academy of Allergy, Asthma & Immunology;
              American College of Allergy, Asthma & Immunology; Dallas Allergy and
              Asthma Center, P.A.; Joint Council of Allergy, Asthma & Immunology; Lyndon
              E. Mansfield M.D., P.A, A Professional Association; PSF, PLLC; Donald
              Aaronson, MD; Gary Gross, MD; Lyndon Mansfield, MD; James Sublett, MD;
              David Weldon, MD; Allergy and Asthma Network/Mothers of Asthmatics, Inc.;
              Tonya Winders, James Wallen & Phadia US Inc.; Atlanta Allergy & Asthma
              Clinic, P.A.; Stanley Fineman, MD, Civil Action No. 14-35, United States District
              Court for the Western District of Texas, San Antonio Division
              Trial Testimony

2017   Academy of Allergy & Asthma in Primary Care and United Biologics, LLC D/B/A United
              Allergy Services. v. American Academy of Allergy, Asthma & Immunology;
              American College of Allergy, Asthma & Immunology; Dallas Allergy and
              Asthma Center, P.A.; Joint Council of Allergy, Asthma & Immunology; Lyndon
              E. Mansfield M.D., P.A, A Professional Association; PSF, PLLC; Donald
              Aaronson, MD; Gary Gross, MD; Lyndon Mansfield, MD; James Sublett, MD;
              David Weldon, MD; Allergy and Asthma Network/Mothers of Asthmatics, Inc.;
              Tonya Winders, James Wallen & Phadia US Inc.; Atlanta Allergy & Asthma
              Clinic, P.A.; Stanley Fineman, MD, Civil Action No. 14-35, United States District
              Court for the Western District of Texas, San Antonio Division
              Deposition

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2013/2014   MM Steel, LP vs. Reliance Steel & Aluminum Co., Chapel Steel Corp., American Alloy Steel, Inc., Arthur J. Moore, JSW Steel (USA) Inc., Nucor Corp. & SSAB Enterprises, LLC D/B/A SSAB Americas, Case No. 4:12-cv-01227, United States District Court for the Southern District of Texas, Houston Division
Deposition and Trial Testimony

OTHER SELECTED CONSULTING EXPERIENCE:

IN RE: EpiPen (Epinephrine Injection, USP) Marketing, Sales Practices and Antitrust Litigation, MDL No. 2785, Case No. 17-md-2785-DDC-TJJ, United States District Court for the District of Kansas

Academy of Allergy & Asthma in Primary Care and United Biologics, LLC D/B/A United Allergy Services. v. American Academy of Allergy, Asthma & Immunology; American College of Allergy, Asthma & Immunology; Dallas Allergy and Asthma Center, P.A.; Joint Council of Allergy, Asthma & Immunology; Lyndon E. Mansfield M.D., P.A, A Professional Association; PSF, PLLC; Donald Aaronson, MD; Gary Gross, MD; Lyndon Mansfield, MD; James Sublett, MD; David Weldon, MD; Allergy and Asthma Network/Mothers of Asthmatics, Inc.; Tonya Winders, James Wallen & Phadia US Inc.; Atlanta Allergy & Asthma Clinic, P.A.; Stanley Fineman, MD, Civil Action No. 14-35, United States District Court for the Western District of Texas, San Antonio Division

Prometheus Franchise Restaurant Holdings, LLC, Southeast QSR, LLC, Coastal QSR, LLC, South Beach QSR, LLC, Florida Bells, LLC, and Mid-South Bells, LLC

Valero Energy Corporation and Subsidiaries

MM Steel, LP vs. Reliance Steel & Aluminum Co., Chapel Steel Corp., American Alloy Steel, Inc., Arthur J. Moore, JSW Steel (USA) Inc., Nucor Corp. & SSAB Enterprises, LLC D/B/A SSAB Americas, Case No. 4:12-cv-01227, United States District Court for the Southern District of Texas, Houston Division

Mary Plubell and Ted Ivey, on behalf of themselves and all others similarly situated vs. Merck, & Co., Inc., Case No. 04CV235817, In the Circuit Court of Jackson County, Missouri at Independence

City of Clinton, Arkansas, vs. Pilgrim's Pride Corporation, and Shelia Adams and James Adams, et al., vs. Pilgrim's Pride Corporation, Action No. 4:09-CV-386-Y (Consolidated With 4:09-CV-387-Y)

April Krueger, Individually and on Behalf of All Others Similarly Situated vs. Wyeth, Inc. F/K/A American Home Products, A Pennsylvania Corporation; Wyeth Pharmaceuticals F/K/A Wyeth Ayerst Pharmaceuticals, A Pennsylvania Corporation; And Does 1 Through 100, Inclusive, Case No 03:03-CV-02496-JAH-AJB, United States District Court Southern District Of California

Shelia Adams and James Adams, et al. v. Pilgrim's Pride Corporation, Civil No. 2:09-CV-397 (TJW-CE), in the United States District Court for the Eastern District of Texas, Marshall Division

Jean Smith and Loria Ivie, on behalf of themselves and others similarly situated v. Barry Collinsworth, Thomas Pugh, United American Insurance Company, Heartland Alliance of America Association, Farm & Ranch Healthcare, Inc. and John Does 1-20, Civil Action No. CV2004-72-2, In the Circuit Court of Saline County, Arkansas

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People's Electric Cooperative v. Western Farmers Electric Cooperative, CIV-09-1129-HE, In the United States District Court for the Western District of Oklahoma

Canadian Valley Electric Cooperative, Inc. v. Western Farmers Electric Cooperative, In the District Court of the 22nd Judicial District Sitting in and for Seminole County, Seminole Division, State of Oklahoma

State of Louisiana, ex rel. James D. Caldwell, Jr., Attorney General v. Merck & Co., Inc., MDL No. 1657, United States District Court, Eastern District of Louisiana

Michael H. Kirsch, D.D.S., individually and on behalf of all others similarly situated vs. Horizon Blue Cross Blue Shield of New Jersey, Inc., Superior Court of New Jersey Law Division – Essex County

Alcoa Inc., vs. Luminant Generation Company LLC, Luminant Mining Company LLC, Sandow Power Company LLC, Luminant Energy Company LLC, and Energy Future Holdings Corp., In the District Court of Milam County, Texas, 20th Judicial District, No. 32,540

In Re: Pilgrim's Pride Corporation, et al., Case No. 08-45664 (DML), In the United States Bankruptcy Court for the Northern District of Texas, Fort Worth Division

Frank's Casing Crew and Rental Tools, Inc. and Frank's International, Inc. v. Tesco Corporation and Tesco Corporation (US), Civil Action No. 2:07-cv-15, In the United States District Court for the Eastern District of Texas, Marshall Division

Logan Farms v. Smithfield, et al; Case No. 05-0766. In the United States District Court for the Southern District of Texas, Houston Division

Alfred T. Giuliano, Trustee on Behalf of Debtors' Estate of Graham-Field Health Products v. Ernst & Young LLP; AAA Case No. 18 199 10398 02 - American Arbitration Association Professional Accounting and Related Services Arbitration Tribunal

The State of Texas v. Merck & Co., Inc., Cause No. GV 503021, In the District Court, Travis County, Texas, 345th Judicial District

Board of Regents, The University of Texas System, on behalf of The University of Texas at Austin and Hydro-Québec v. Nippon Telephone and Telegraph Corporation, Cause No. A 01 CA 47, In the Western District of Texas, Austin Division

ReedHycalog UK, Ltd., ReedHycalog, LP, and Grant PrideCo, Inc. vs. Baker Hughes Oilfield Operations, Halliburton Energy Services, Inc., US Synthetic Corporation, In the U.S. District Court for the Eastern District of Texas, Tyler Division; Civil Action No. 6:06-CV-222(LED)

Champagne Metals, an Oklahoma Limited Liability Company vs. Ken-Mac, Inc., an Ohio corporation; Samuel, Son & Co., Limited, an Ontario, Canada corporation, Samuel Specialty Metals, Inc., a New Jersey corporation, Metal West, L.L.C., an Alabama limited liability company, Integris Metals, Inc., a New York corporation, Earle M. Jorgensen Company, a Delaware corporation, and Ryerson Tull, Inc., an Illinois corporation; in the U.S. Dist. Court for the Western District of Oklahoma; No. CIV-02-528-C.

Rick Love, M.D., et al., vs. Blue Cross and Blue Shield of Arizona, Inc., et al., in the U.S. District Court, Southern District of Florida, Miami Division; Case No. 03-21296-CIV-Moreno.

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Century Martial Art Supply, Inc. v. Martial Arts Enterprises, Inc.; No. 03-1711-T; USDC WD Oklahoma; Arbitration Number 71 181 J 00407 05

Brazos River Authority v. Ionics, Incorporated; Civil Action No. W 03 CA 324, in the U.S. District Court of Texas, Waco Division

Parkade Center, Inc. v. Simon Property Group (Texas), L.P. and Simon Property Group (Delaware), Inc.; Cause No. C-2584-06-1, in the 398th Judicial District of Hidalgo County, Texas

Natalie M. Grider, M.D., et al. v. Keystone Health Plan Central, Inc., et al.; In the U.S. District Court for the Eastern District of Pennsylvania

Milissa Boisseau v. 7-Eleven, Inc.; Cause No. 04-05250; In the 68th Judicial District Court, Dallas County, Texas

John Ivan Sutter, M.D., P.A. on behalf of himself and all others similarly situated vs. Horizon Blue Cross Blue Shield of New Jersey, Inc., Superior Court of New Jersey, Law Division Essex County, Docket No. ESX-L-3685-02

EEMSO, Inc. v. Compex Technologies, Inc. f/k/a Rehabilicare, Inc. and Iomed, Inc.; Civil Action No. 3:CV-05-0897-P; In the United States District Court, Northern District of Texas, Dallas Division

Scruggs Management Services, Inc. d/b/a Scruggs Consulting v. Panasonic Communications & Systems Co., et al.; No. 01-0151; In the Supreme Court of Texas

Gary Shapiro and Rich Fitzgerald, individually and on behalf of all others similarly situated v. International Business Machines Corporation, Docket No. MID-L-007413-02; Superior Court of New Jersey Law Division: Middlesex County

Crest Foods of Edmund, LLC v. Wal-Mart Stores, Inc., Cause No. CIV-00-1659-F; In the U.S. District Court, Western District of Oklahoma

Andrew Daugherity, et al., v. International Business Machines Corporation, Cause No. 23,162; In the District Court of Burleson County, Texas, 21st/335th Judicial District

Logan Farms, Inc. and James P. Logan, Jr. v. Honeybaked Ham, L.P., Mi., et al., Cause No. H-01-1611; In the U.S. District Court for the Southern District of Texas, Houston Division
Park Cities Hotel, L.P. v. Meristar Management Company, L.L.C. Cause No. 01-08447; In the District Court, Dallas County, Texas, B-44th Judicial District

Marion Crane, et al., v. International Paper Company and Canal Wood, LLC; Civil Action No.: 3-02-3352-17; In the United States District Court for the District of South Carolina, Columbia Division

Richard A. Lippe, et al. v. Bairnco Coporation, et al. Case No. 96-CV-7600, United States District Court For the Southern District of New York

Alcatel USA, Inc. v. Cisco Systems, Inc. Case No. 4:00cv199, United States District Court for the Eastern District of Texas Sherman Division

IMODCO Inc. v. FMC Corporation and SOFEC, Inc., Cause No. H-99-2174, United States District Court, Southern District of Texas, Houston Division

American Permanent Ware Company v. Emerson Electric Co., d/b/a Chromolax, Don Shuhart Company, and Maytag Corp. d/b/a Heatube, Maytag Clarence Component Parts, Cause No. 00-07351; In the 298th Judicial District, Dallas County, Texas

Palacio del Rio, Ltd. v. Hilton Hotels Corporation, et al., Cause No. 2000-CI-13691; In the 407th Judicial District Court, Bexar County, Texas

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Acme Plumbing & Heating Co., Inc. and Bruce Brooks v. Morrison Supply Company, Inc., et al., No. 80534-B, District Court of Potter County, Texas 181st District Court

Todd E. Samuelson, M.D. and Todd E. Samuelson, M.D., P.A., Individually and On Behalf of All Other Persons Similarly Situated, Appellants V. United Healthcare of Texas, Inc. and United Healthcare Insurance Company, Appellees, No. 2-01-407-CV, Court of Appeals of Texas, Second District, Fort Worth

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BSA Enterprises, Inc. d/b/a BSA Provider Network v. Healthsmart Preferred Care II, L.P.; No. 91253-E - In the 108th District Court, Potter County, Texas

HomeTeam Pest Defense LLC v. Curtis Warren and OnDuty Security Systems, Inc.; Cause No. C-2004-32777; In the District Court, Harris County, Texas; 189th Judicial District

KCI Licensing, Inc., KCI USA, Inc., and Wake Forest University Health Sciences v. Bluesky Medical Corporation, Medela AG, Medela, Inc., and Patient Care Systems, Inc., In the United States District Court for the Western District of Texas, San Antonio Division; Civil Action No. SA-03-CA-0832-RF; Kinetic Concepts, Inc.

VAE Nortrak North America, Inc., Meridian Track Products Corp., and Meridian Rail Information Systems Corp. v. Progress Rail Services Corporation; Civil Action No. 03 CV 1480; In the United States District Court for the Northern District of Alabama, Middle Division

Brazos River Authority v. Ionics, Incorporated; Civil Action No. W 03 CA 324, in the U.S. District Court of Texas, Waco Division

In the Matter of the Arbitration Ordinance (Chapter 341 of the Laws of Hong Kong) and In the Matter of An Arbitration Between Brunswick Bowling & Billiard Corporation and Shanghai Zhonglu Industrial Company Limited and Chen Rong

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"Liability and Large-Scale, Long Term Hazards," with Al Ringleb, *Journal of Political Economy*, 1990, Vol. 98(3), pp. 574-595. Reprint in *Economics and Liability for Environmental Problems*, Kathleen Segerson, Editor, Burlington, VT: Ashgate, 2002.

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"Plant Closings, Worker Reallocation Costs, and Efficiency Gains to Labor Representation on Boards of Directors," with E. Furubotn, *Journal of Institutional and Theoretical Economics*, Vol. 140, No.1, March 1984, pp. 176-92.

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"Quality Uncertainty, Search, and Advertising," with W.J. Lane, *American Economic Review*, Vol. 73, No. 5, December 1983, pp. 881-94.

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"Economic Factors Affecting Investment in Planned Birth Technologies," Congressional Office of Technology Assessment, 1980.

PAPERS IN PROGRESS:

"Testing Theories of Price Dispersion and Scarcity Pricing in the Airline Industry," with Steven L. Puller and Anirban Sengupta.

"Pyramidal Ownership in Ecuadorian Business Groups," with Maria L. Granda.

REVIEW RESPONSIBILITIES:

Editorial Board Member:

Journal of Regulatory Economics: 1989-1993.
Journal of Corporate Finance: 1994-2000.

Referee for:

American Economic Review
Applied Economics
Bulletin of Economic Research
Economic Inquiry
Economic Journal
International Economic Review
Journal of Corporate Finance
Journal of Economic Behavior and Organization
Journal of Economics and Management Strategy
Journal of Environmental Economics and Management
Journal of Finance
Journal of Health Economics
Journal of Industrial Economics
Journal of Institutional and Theoretical Economics
Journal of Law and Economics
Journal of Law, Economics, and Organization
Journal of Political Economy
Journal of Regulatory Economics
Journal of the Japanese and International Economies
Managerial and Decision Economics
National Science Foundation
Quarterly Review of Economics and Business
RAND Journal of Economics
Review of Economics and Statistics
Southern Economic Journal

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Ph.D. STUDENTS (YEAR OF COMPLETION) DISSERTATION TITLE:

Steve Hackett (1989), *Essays on the Economics of Contracting and Institutional Choice*

Andreas Ortmann (1991), *Essays on Quality Uncertainty, Information, and Institutional Choice*

Robert Maness (1992), *Essays on Organization, Form, and Pricing Behavior*

Hanne Meihuizen (1994), *Three Essays on Contracts*

Wenjie Shi (1997), *An Integrated Approach To The Choice Between Firms, Joint Ventures And Entrepreneurial Enterprises*

Jennifer Vanderhart (2000), *Quality Signals, Word-of-Mouth, and Star Power: The Determinants of Motion Picture Success*

Jun Byoung Oh (2002), *Southwest Airlines and Competition in the Airline Industry*

Ahmed Alwaked (2005), *Estimating Fare and Expenditure Elasticities of Demand for Air Travel in the U.S. Domestic Market*

Jong Ho Kim (2006), *Price Dispersion in The Airline Industry: The Effect Of Industry Elasticity And Cross-Price Elasticity*

Ivan Tasic (2006), *Impact Of Retailers Promotional Activities on Customer Traffic*

Zeynal Karaca (2007) *The Impacts of Break-Through Drug Classes on Total Health Expenditures: Empirical Evidence from the 1996-2001 Medical Expenditure Panel Survey*

Anirban Sengupta (2007) *Airline Pricing, Price Dispersion, and Ticket Characteristics On and Off the Internet*

Maria Granda Kuffo (2009) *Pyramidal Ownership in Ecuadorian Business Groups*

Manuel Hernandez (2009) *Nonlinear Pricing Strategies and Market Concentration in the Airline Industry*

Sung Ick Cho (2012) *Essays on a Monopolist's Product Choice and its Effect on Social Welfare*

Fan Ji (2012) *The Drivers of Mergers and Acquisitions in Pharmaceutical Industry*

José Pellerano (2013) Search *Costs in Airline Markets*

Xiaoyuan Wang (2014) *Essays on Consumer Behavior and Demand Analysis*

Jinkook Lee (2014) *Empirical Essays on the U.S. Airline Industry*

CONFERENCE PRESENTATIONS:

2018

"Algorithmic Pricing and Antitrust," Dallas Bar Association, Dallas, TX.

2010

"Pyramidal Ownership in Ecuadorian Business Firms," Business Association of Latin American Studies, Barcelona, Spain.

1997

The Brookings Institution, Conference on Human Capital and the Theory of the Firm, Washington, D.C.

1996

National Bureau of Economic Research, Summer Institute, sessions on New Approaches to Supply and Demand Analysis and Aging, Health Care and Productivity, Cambridge, MA.

University of Chicago, ELO Workshop, "Information Cascades and Contractual Incompleteness in Natural Gas Contracting, Chicago, IL

University of Wisconsin-Madison, IO Workshop, "Information Cascades and Contractual Incompleteness in Natural Gas Contracting, Madison, WI

1995

National Bureau of Economic Research, Spring IO meetings, "Price Competition in Pharmaceutical Markets," Boston, MA.

1994

American Economic Association, "The Price of Pharmaceuticals," Boston, MA.

Southern Economic Association, "Pricing and Promotion of Pharmaceuticals," New Orleans, LA.

1993

National Bureau of Economic Research, "Cooperation, Coordination, and Collusion Among Firms," Boston, MA.

Harvard Conference on the Pharmaceutical Industry, Boston, MA.

1992

Tenth Annual Seminar on the New Institutional Economics, Wallerfangen, Germany.

Future of the Pharmaceutical Industry: Developments in Market Structure and Technology, MIT.

Editors Conference for the Journal of Regulatory Economics, October 1992.

1991

Annual Meetings of the Pharmaceutical Manufacturers' Association, Session on Models of Pharmaceutical Competition.

Annual Meetings of Southern Economic Association, Session on the Pharmaceutical Industry.
1990

Annual Meetings of the American Economic Association, Session on Experimental Economics Unitization.

Eighth Annual Seminar on the New Institutional Economics, Wallerfangen, Germany.

1989

"Improving the Translation of Research Findings into Clinical Practice: The Changing Economics of Technological Innovation in Medicine" Sponsored by National Academy of Sciences, Washington, DC.

Carnegie-Mellon Conference on Political Economy.

Seventh Annual Conference on the New Institutional Economics in Saarbrucken, West Germany.

Econometric Society Summer Meetings, Ann Arbor, Michigan.

1988

Annual Meetings of the American Economic Association, Session on Endogenous Institutional Choice.

Annual Meetings of the Economic Science Association (Experimental), San Francisco, Sessions on Public Goods Experiments and Experiments on Institutional Choice.

Sixth Annual Conference on the New Institutional Economics, Saarbrucken, Germany

Second Annual Hayek Symposium on Knowledge, Information, and Competition, Freiburg, Germany.
1987

Fifth Annual Conference on the New Institutional Economics, Saarbrucken, Germany.

First Annual Hayek Symposium on Knowledge, Information, and Competition, Freiberg, Germany.
American Economic Association Meetings, Session on Regulation and Long Term Contracts, Chicago.

1986

Econometric Society Meetings, Winter Meetings, New Orleans, Session on Long Term Contracts.

NBER Summer Institute, Cambridge, MA.

Fourth Annual Conference on the New Institutional Economics, Saarbrucken, Germany.

Thirteenth Annual Interlaken Conference, Interlaken, Switzerland.

1985

American Economic Association, Session on Monopoly and Competition, New York.

Third Annual Conference on the New Institutional Economics, Saarbrucken, Germany.

Twelfth Annual Interlaken Conference, Interlaken, Switzerland.

1984

Conference on Management and Regulation: The Basis of a Corporate Policy, sponsored by Stevens
    Institute of Technology, Hoboken, New Jersey.

Conference on Economics and Philosophy, sponsored by Civitas, Munich.

Second Annual Conference on the New Institutional Economics, sponsored by the Saarlands,
    Mettlach, Germany.

Eleventh Annual Interlaken Conference, sponsored by the Universities of Bern and Rochester,
    Interlaken, Switzerland.

1983

Econometric Society Winter Meetings, Billboard Session.

First Annual Conference on the New Institutional Economics, sponsored by the University of the
    Saarlands, Mettlach, Germany.
    1982

Arne Ryde Symposium on Pharmaceutical Economics, Helsingborg, Sweden.

Session on Problems of Industrial Policy, American Economic Association Annual Meeting,
    December.

1981

Western Economic Association Meetings, Session on Strategic Planning Models, Association

1980

Conference on The Conglomerate Corporation, sponsored by the University of Florida, Gainesville.

1979

Conference on Drugs and Health: Economic Issues and Policy Objectives, American Enterprise
Institute, Washington, D.C.

WORKSHOP PRESENTATIONS:

2010

University of Washington, University of Texas at Arlington

1996

University of Wisconsin, University of Chicago, Rice University

1995

Rice University

1994

University of Chicago, UCLA

1993

Penn State, University of Houston, Louisiana State University

1992

Oklahoma State University, University of Pennsylvania
1991

Northwestern University, University of Chicago, Rice University

1990

University of Pennsylvania, Brown University

1989

Harvard, State University of New York-Albany, Massachusetts Institute of Technology, University of
Chicago, University of Michigan, Boston University, Columbia University, Northwestern
University, University of Indiana, Ohio State, UCLA

1988

University of Chicago, Stanford University, University of California-San Diego, University of Illinois,
Washington University, University of Bonn, University of the Saarlands, University of Wurzburg,
University of Washington

1987

Virginia Commonwealth University, University of New Orleans, University of Arizona, UCLA,
Federal Trade Commission, George Mason University, University of Houston, University of Texas,
University of Zurich

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1986

Northwestern University, Carnegie Mellon, University of Rochester, Penn State, University of Michigan, University of California-San Diego

1985

Federal Reserve Bank of Dallas, Washington University-St. Louis, Yale University, University of Houston

1984

University of British Columbia, University of Washington, Northwestern University, University of Michigan, Duke University, Yale University

1983

University of Houston, University of Texas

1982

MIT

1981

Federal Trade Commission

Appendix B: Materials Relied Upon

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[REDACTED]

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Appendix C: Further Analyses of Transaction Counts
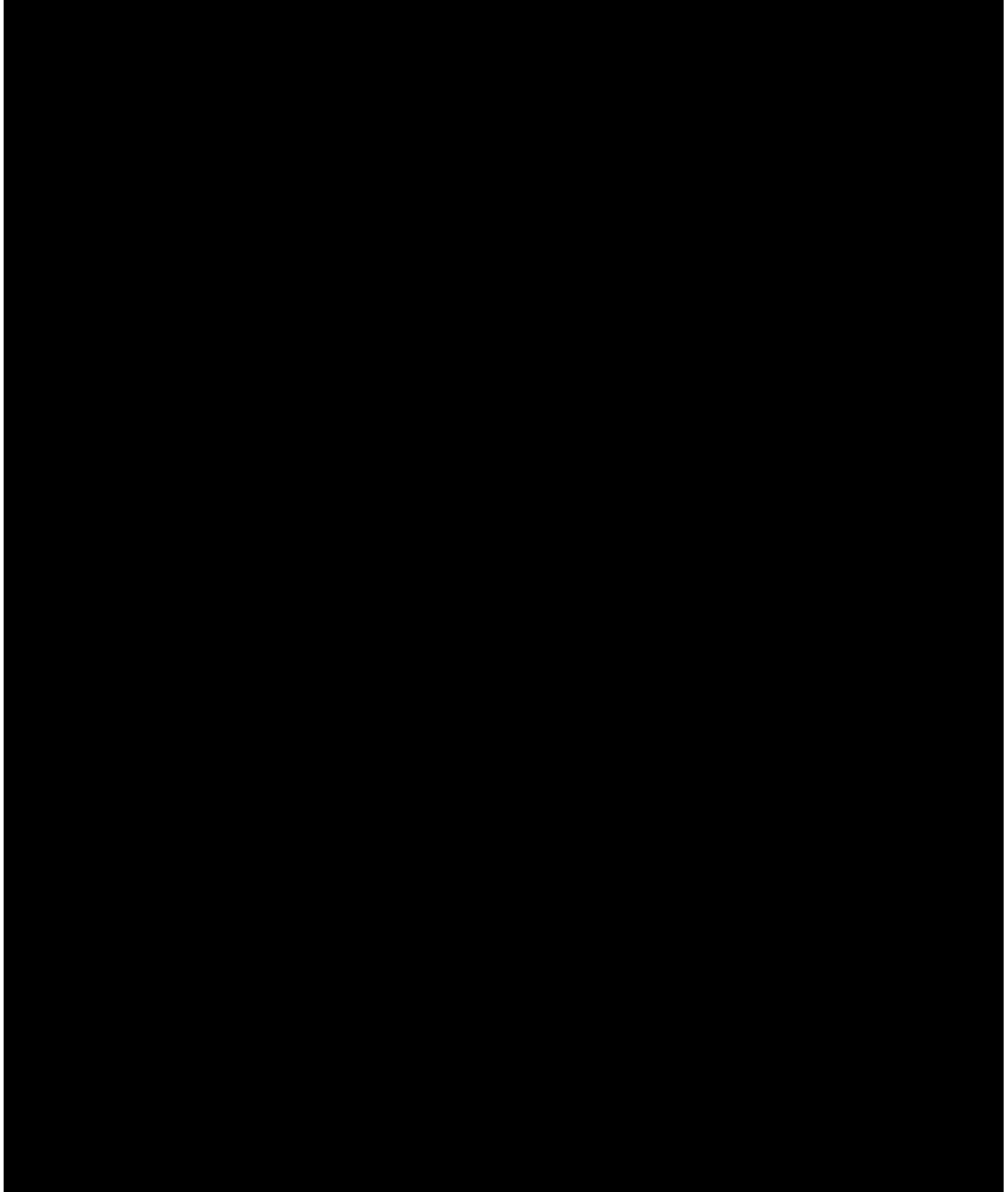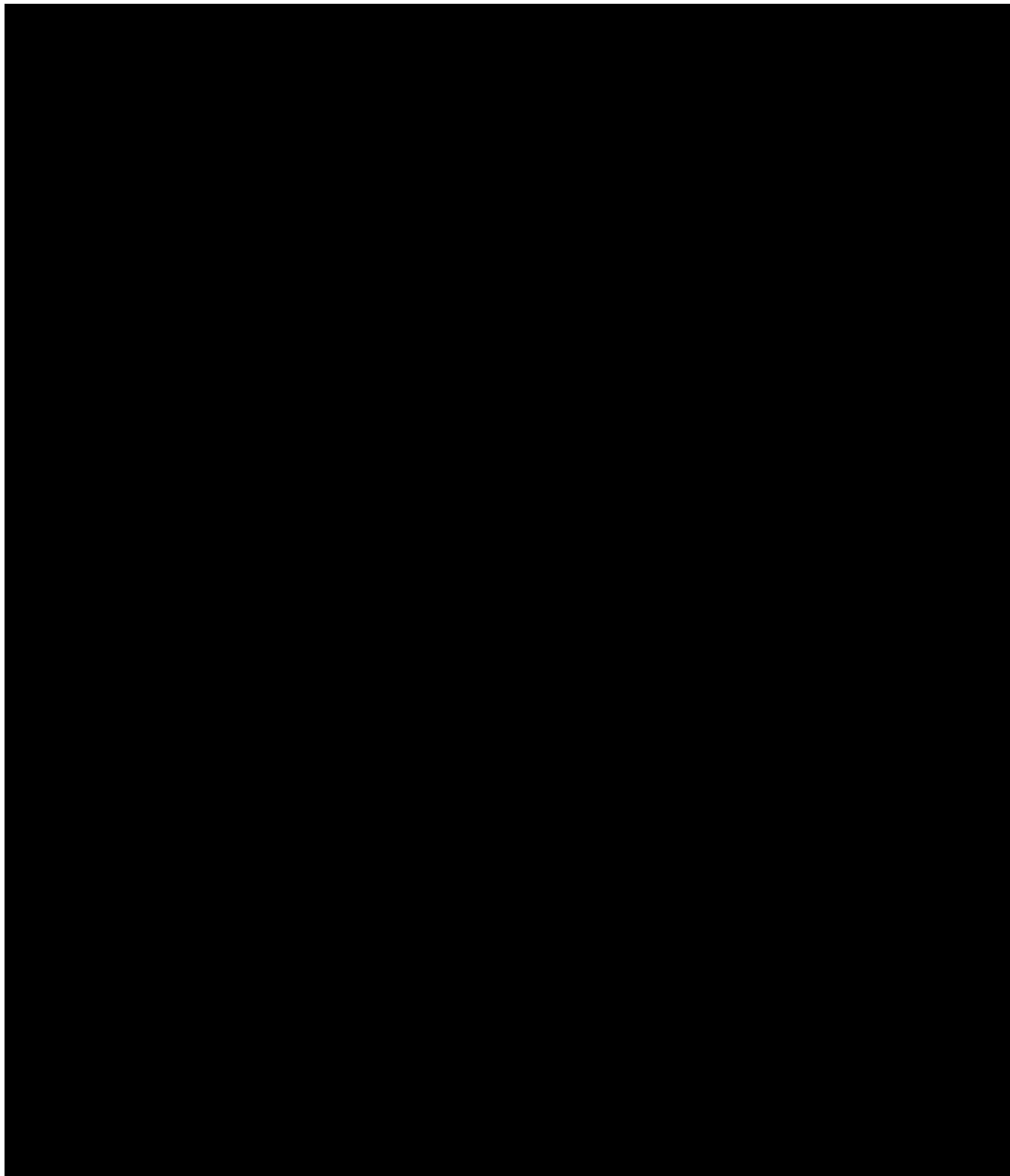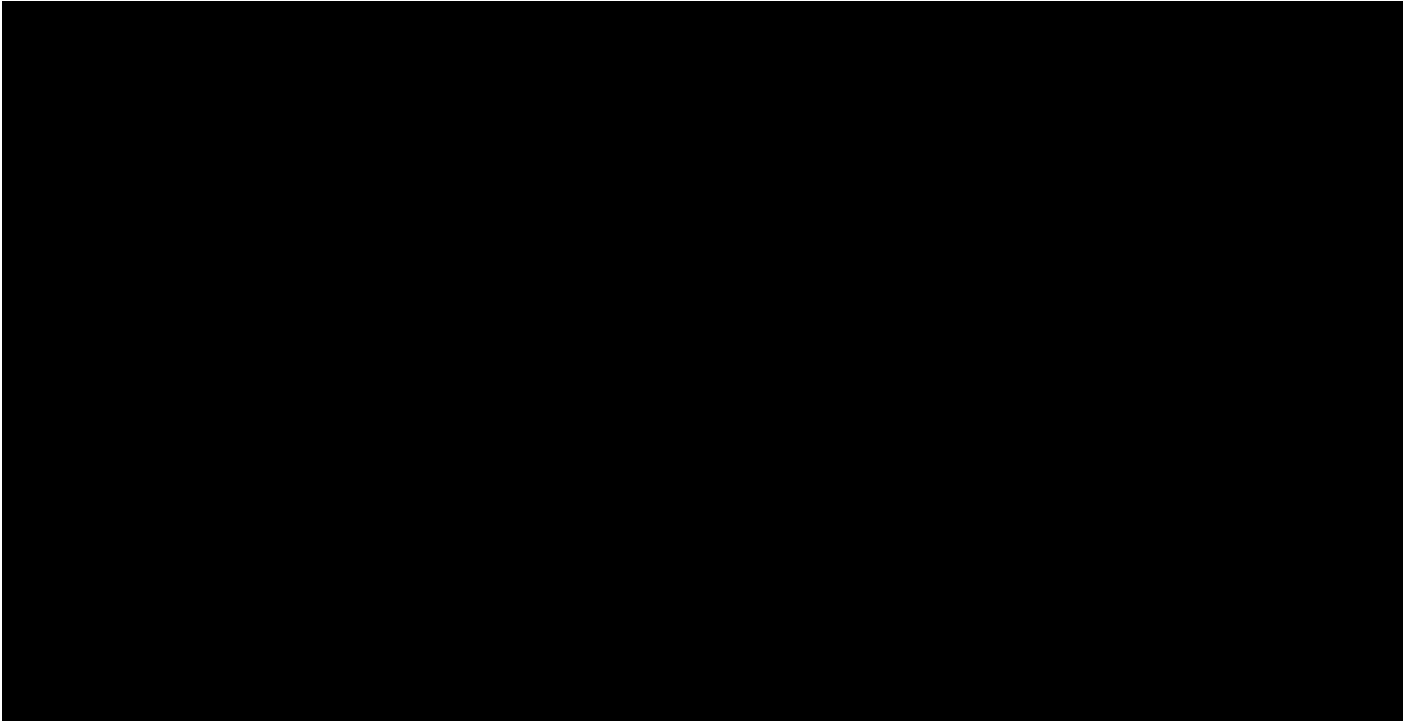
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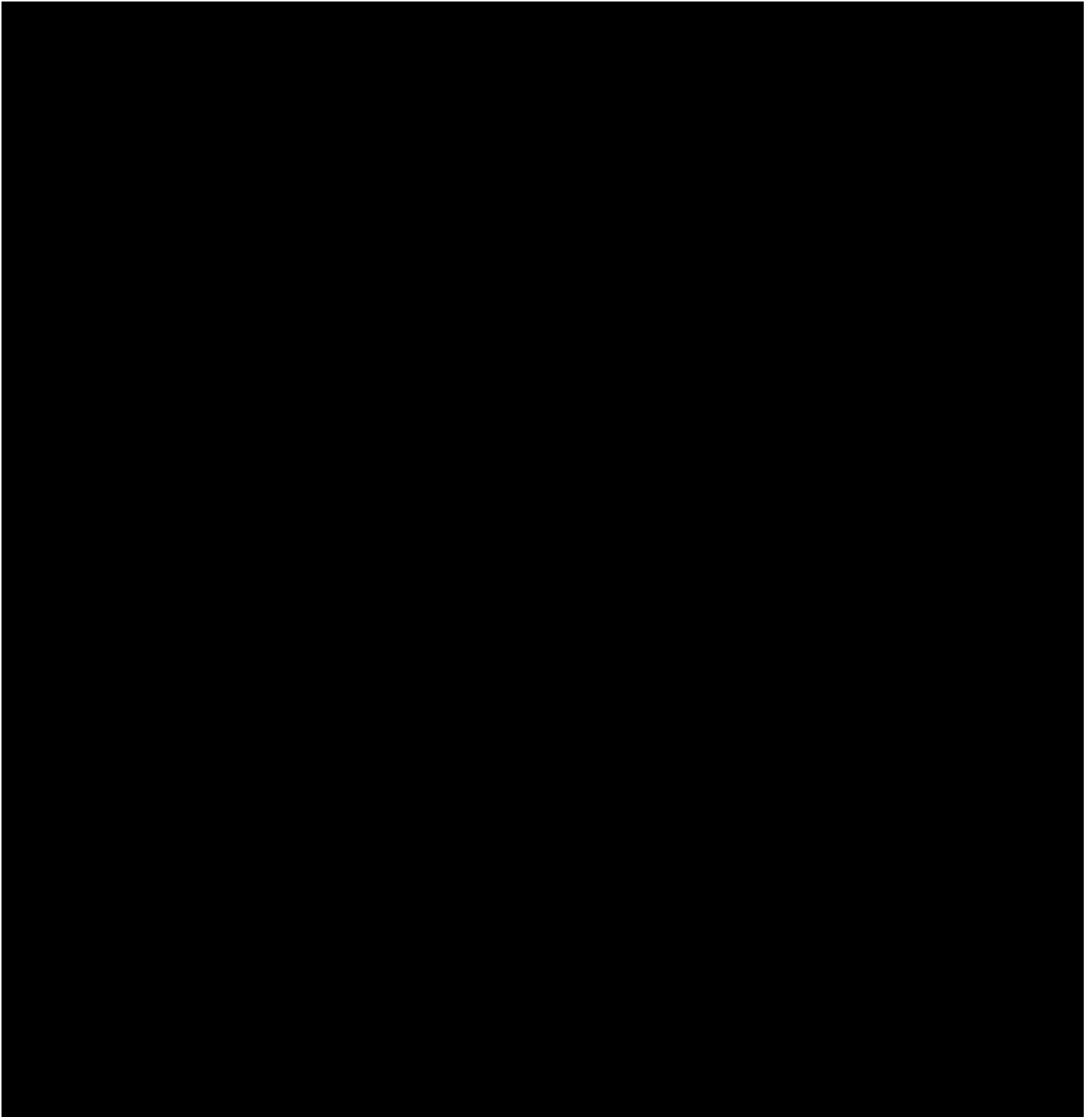
Appendix D: **Estimates of Increase to Google's Profit from the Alleged Deception**

284.   In Section VII, I conclude that the alleged deception related to RPO, DRS v1, DRS v2, and Bernanke was unlikely to have impacted auction outcomes because advertisers and publishers likely would not have responded any differently in a "but-for world" (free from the alleged deception) than they did in the actual world (where they already learn and experiment regularly). In this Appendix, however, I provide estimates of the impact that the alleged deception about each of these programs could have had on Google's profit if one were to adopt plaintiffs' incorrect assertion that the alleged deception prevented advertisers and publishers from learning and adjusting their strategies. I focus specifically on the impact of the alleged *deception* about each program, separate from the impact of the *program itself*. In short, I isolate the effect of the alleged deception about each program on Google's profit.

285.   In my analyses below, I begin by evaluating plaintiffs' experts' description of how the alleged deception about each program impacted advertiser bidding behavior. I then quantify the extent to which such changes in advertiser bidding behavior could have generated increased profits for Google, if plaintiffs' experts' theory was accurate. I also analyze plaintiffs' experts' assertions regarding how publisher behavior would have been different, absent the alleged deception, and any likely impacts to Google's profit.

286.   Mr. Andrien asserts that "Google directly benefits from its misconduct every time an auction clears on AdX that would not have cleared but-for the misconduct, or if the clearing price was higher than it would have been absent the misconduct."[522] As explained in Section III.B., I interpret this statement to posit what economists generally refer to as "quantity effects" and "price effects."

1.   Advertiser Responses That Could Have Generated Incremental Google Profit Through Price Effects If Plaintiffs' Theory Was Correct

287.   Plaintiffs' experts argue that the alleged deception about RPO, DRS v1, and Bernanke led

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[522] Andrien Report at ¶ 110. In the same paragraph, Mr. Andrien goes on to explain, "For example, each time an auction cleared in AdX because Google used DRS to adjust its take rate, Google directly benefited because it earned a fee that it would not have earned without employing DRS. Similarly, each time the clearing price of an auction was higher than it would have been but for Google's use of RPO, Google directly benefited because its fees are set as a percentage of the auction price. Therefore, the higher the clearing price, the higher Google's fee." *Id.*

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to higher clearing prices on AdX auctions because that alleged deception prevented advertisers from shading (i.e., lowering) their bids, which (all else equal) would have led to lower auction clearing prices in the but-for world. Under plaintiffs' theory, reduction in clearing prices in the but-for world implies that Google generated more revenue and profit in the actual world than it would have generated in the but-for world.[523] Separately for RPO, DRS v1, and Bernanke, I quantify such incremental profits using the nine-step methodology described below.

288.   Step 1: I begin with the number of Open Auction transactions[524] on AdX won by DV360 or Authorized Buyers that (i) are associated with U.S. users, (ii) occurred between the time when the program in question was launched and when it was disclosed, and (iii) can be allocated to plaintiff States using Mr. Andrien's methodology.[525] Next, I compute the percentage of those transactions in which the clearing price was set by a bidder who, according to plaintiffs' experts' theory, would have shaded its bids in the but-for world.[526] I then multiply the number of transactions by the percentage of transactions in which the clearing price was set by a bidder who would have shaded. I refer to the resulting figure as the "baseline transaction count for DV360/Authorized Buyers."

289.   Step 2: I repeat the calculations described in Step 1 for auctions won by Google Ads. I refer to the resulting figure as the "baseline transaction count for Google Ads."

290.   Step 3: I sum the baseline transaction count for DV360/Authorized Buyers (Step 1) and the baseline transaction count for Google Ads (Step 2) to arrive at the total number of transactions in which the clearing price is set by bidders who would have shaded their bids in the but-for world, according to plaintiffs' theory. I refer to the resulting figure as the "baseline total transaction count."

291.   Step 4: I calculate the average clearing price of those transactions included in the baseline total transaction count (Step 3).

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[523] Andrien Report at ¶ 110.

[524] Following Mr. Andrien, I count transactions on the basis of matched queries. See Andrien Report at ¶ 97.

[525] See Andrien Report Exhibit 1, which shows that Mr. Andrien allocated approximately 29% of transactions to plaintiff States.

[526] The set of bidders who would have shaded their bid in the but-for world, under plaintiffs' theory, varies by the alleged deceptive program. For RPO and DRS v1, only DV360 and Authorized Buyers bidders would be incentivized to shade bids because Google Ads was exempt from those programs. For Bernanke, only Google Ads bidders would be incentivized to shade bids because only Google Ads was subject to Bernanke.

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292.   <u>Step 5</u>: I calculate a "shading factor" to scale how much higher average clearing prices are in the actual world, as compared to the but-for world posited by plaintiffs. This calculation involves the multiplication of two inputs.

293.   The first input into the shading factor assumes that, in plaintiffs' but-for world, advertisers would shade their bids by ███████ in auctions where they know they will pay their bid in every auction. ██ ██ This assumption likely overstates the amount of shading that would be optimal because advertisers likely would shade less when bidding into a larger exchange such as AdX.[529] Accordingly, this assumed level of shading likely leads me to overestimate Google's profit from the alleged deception.

294.   The second input into the shading factor estimates the percentage of transactions won by a bidder subject to the program at issue in which that bidder paid either the amount of its bid, or in the case of RPO, the RPO floor price.

295.   By multiplying these two inputs, I derive a "shading factor." This shading factor is a weighted average of how much advertisers would shade if they knew that they were going to pay their bid on every auction ████ and how much they would shade in the absence of

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[527] Project Poirot was designed to identify exchanges that were using non-second price auctions, and then reduce advertiser bids into those exchanges to maximize expected advertiser surplus (i.e., the difference between how much advertisers value impressions and how much they pay for them). See, e.g., GOOG-DOJ-11247631 at -631 ("We always knew that some exchanges deviate from second price auctions. This project uses an algorithmic framework to detect deviations from second price auctions and adjust advertiser's fixed CPM bids *with the goal to win the same impression at a lower price*.") (emphasis in original)); see also 30(b)(6) ██████ (Google) Deposition at 245:19-246:5 ("Project Poirot itself applied to every exchange; but, of course, a non-second-price auction exchange is where we expect the optimal bid to differ from the fixed CPM number.… What Project Poirot is really doing is it's maximizing -- it's trying to come up with the optimal bid to the exchange to maximize advertiser surplus.").

[528] See GOOG-DOJ-05283173 at -179.

[529] It is well-known in auction theory that an increase in the number bidders in a first price auction reduces the optimal amount of shading. The intuition for this result is that with a larger number of bidders, there is a higher probability that a rival bidder will have a high value for the impression and thus submit a high bid, creating an imperative that each bidder submit a higher bid that is closer to its value (i.e., shade less) to increase its chance of winning. The logic is the same as when firms set lower prices when facing more competition. See Easley, David and Jon Kleinberg, "Chapter 9: Auctions," *Networks, Crowds, and Markets: Reasoning about a Highly Connected World*, Cambridge University Press, 2010, pp. 249-273 at 257, available at https://www.cs.cornell.edu/home/kleinber/networks-book/networks-book-ch09.pdf (last accessed July 25, 2024) ("[I]t is intuitively natural that your bid should be higher – i.e. shaded less, closer to your true value – in a first price auction with many competing bidders than in a first-price auction with only a few competing bidders (keeping other properties of the bidders the same."); id. at 263 ("The form of this strategy highlights an important principle … about strategic bidding in first-price auctions: as the number of bidders increases, you generally have to bid more 'aggressively,' shading your bid down less, in order to win.").

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the program in question (0%), where the weight is the frequency with which the winning

bidder pays its own bid or, in the case of RPO, the RPO floor price.

296.   Step 6: I estimate the per-transaction increase in clearing price due to the alleged

deception about the program by multiplying the average clearing price (Step 4) by the

shading factor (Step 5).[530]

297.   Step 7: I estimate Google's total additional gross revenue from the alleged deception about

the program by multiplying the baseline total transaction count (Step 3) by the per-

transaction change in clearing prices (Step 6).

298.   Step 8: I calculate the average Google revenue share on the transactions included in the

baseline total transaction count (Step 3) as a weighted average of the Google revenue

shares on transactions won by Google Ads, DV360, and Authorized Buyers.[531]

299.   Step 9: I calculate Google's additional net revenue from the alleged deception (under

plaintiffs' theory) by multiplying the total additional gross revenue to Google (Step 7) by

the average Google revenue share (Step 8). I assume that the affected transactions would

have occurred with or without the bid shading, which implies that Google's costs would

be the same in the actual and but-for worlds. As a result, Google's additional net revenue

from the alleged deception equals its incremental profits from the alleged deception.

300.   In addition to claiming that the alleged deception prevented advertiser bid shading,

plaintiffs' experts theorize that the alleged deception about RPO, DRS v1, and Bernanke

prevented publishers from optimizing their price floors.[532] I do not attempt to quantify the

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[530] I assume that shading does not change the rank order of bids, so it does not change the identity of the bidder that
sets the clearing price.

[531] For transactions won by Authorized Buyers, the relevant revenue share is AdX's revenue share; for transactions
won by Google Ads, the relevant revenue share is the cumulative revenue share of AdX and Google Ads; and for
transactions won by DV360, the relevant revenue share is the cumulative revenue share of AdX and DV360.

[532] For example, for RPO, see Andrien Report at ¶ 33 ("I further understand that RPO impacted both publishers and
advertisers because it led to lower payoff to advertisers and it could prevent publishers from effectively optimizing
revenue, and that such negative impacts partially stem from Google's concealment of RPO."); id. at ¶ 34 ("In
addition, I understand that both before and after RPO was announced as optimized pricing, RPO impacted publisher
behavior. For example, by concealing RPO, Google prevented publishers from effectively optimizing revenue, and
even after it was disclosed, publishers might set suboptimal reserves on any impression for which RPO may have
been active.").

For DRS v1, see Weinberg Report at ¶ 219 ("Google concealed material information from publishers by not
disclosing the implementation of DRSv1. Since publishers believed that AdX runs a regular second-price with their
given reserve price and a static take rate of 20%, a strategic publisher would set a price floor that maximized their
revenue under these circumstances. Had they known AdX dynamically adjusted its take rate, publishers would set

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effect of the hypothesized changes in publisher price floors for several reasons.

301.   First, none of plaintiffs' experts have provided evidence, or even asserted, that the hypothesized changes in price floors imply that Google profited as a result of the deception.

302.   Second, the effect of changes in price floors on Google's profits is theoretically ambiguous. Consider, for example, a case in which publishers increased the price floor in the but-for world:

   a.   For transactions that clear on AdX even with the higher floor, the higher floor would increase the clearing price and thus raise Google's profit.

   b.   For transactions that do not clear on AdX due to the higher floor, (but would have cleared with the lower floor), the higher floor would reduce Google's profit.

   c.   Because the two effects have opposite implications for Google's profit, the net effect is theoretically ambiguous.

303.   Third, economic analysis suggests that a publisher would only change its price floors if doing so resulted in increasing its own revenues from AdX.[533] The reason is that, as a general matter, firms make decisions based on whether the incremental benefits from a decision exceeds its incremental costs.[534] As a result, if a publisher in the but-for world were to set different reserve prices than in the actual world, economic reasoning predicts

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different price floors."); see also *id.* at ¶ 219 footnote 333 ("That is, one natural publisher response to DRSv1 is to increase price floors on AdX.").

For Bernanke, see Weinberg Report at Section VIII.C.3 Title ("publishers would have raised their reserve prices to maximize their revenue had they known about Projects Bernanke and Global Bernanke.").

[533] This assumes that a publisher's opportunity cost of selling the impression on AdX—as opposed to other available demand sources—is not affected by the alleged deception, which I believe is a reasonable assumption. Furthermore, some publisher reserve prices tend to overstate the publisher opportunity cost of the impression, which makes it less likely that publishers would find it optimal to lose AdX transactions. See August 4, 2023 ▮▮▮▮ Declaration at ¶ 11 ("Some publishers set Value CPMs based on their estimates of what CPM a line item would likely generate (taking into account its historical performance) or based on a fixed price the publisher had negotiated with a particular remnant demand partner. Some publishers set Value CPMs higher than their estimates of what CPM a line item would likely generate to increase competitive pressure in the AdX auction or for other reasons."); see also GOOG-DOJ-03998505 at -506 ("We've anecdotally heard from some publishers that they inflate the value CPM of remnant line items to try and extract more value from AdX."); ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

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▮▮▮▮ (Google), "Re: Unified Auction Changes (Sellside) Executive Update – Aug 12, 2019," August 19, 2019, GOOG-DOJ-07960537 at -538 (reporting that "many publishers … apply a boost to Header Bidding bids" and that "these inflated CPMs are used to provide price pressure for AdX, which can result in increased publisher revenue.").

[534] See, e.g., Mankiw, N. Gregory, *Principles of Microeconomics*, Cengage Learning, 5th ed. 2008, at 294.

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that change would occur because the publisher generates higher revenue from the higher price floor, which also leads to higher net revenue for AdX and higher profits for Google in the but-for world because AdX revenue is based on a revenue-sharing model with publishers.[535] Thus, under plaintiffs' theory, if publishers were to change their price floors in the but-for world, then Google's profits would be *lower* in the actual world than the but-for world. As a result, disregarding the effect of the alleged deception on publisher floors is conservative for purposes of this analysis.

a. Reserve Price Optimization

304.   Plaintiffs' experts theorize that, if advertisers had understood that RPO used information gleaned from their historical bids to set price floors closer to their true values, then they would have shaded their bids because, by bidding less for impressions, advertisers would induce Google to set lower future RPO floor prices.[536] This theory implies that the alleged deception about RPO caused clearing prices for some auctions to be higher than they would have been in the but-for world, leading to increased Google profits from this "price effect."

305.   I calculated the incremental Google profit from the alleged deception about RPO using the nine-step methodology described above for estimating how, according to plaintiffs' theory, the alleged deception prevented advertisers from responding optimally to their environment by shading their bids. Each of the steps is described below and summarized in the second-to-last column of Table D1.

306.   In Step 1, I begin by determining from Google data that there were ███████████

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[535] Professor Weinberg acknowledges in his report, "if Google is good at optimizing reserves via RPO, a publisher may wish to lower the reserve it sets on AdX in order to give AdX greater flexibility in optimizing its reserve, which would lead to greater revenues for both AdX and the publisher." Weinberg Report at ¶ 279. Dr. Pathak also suggests that, had they known about RPO, "publishers would change their reserve prices. Reserve prices are an important tool of revenue maximization for publishers. If they knew Google was going to adjust their reserve prices, they would take that information into consideration when they are calculating their optimal reserve prices." Pathak Report at ¶ 191. Dr. Pathak, however, does not explain how he believes publishers would have changed floors.

[536] See, e.g., Weinberg Report at ¶¶ 283-285 ("[With RPO] submitting a high bid equal to an advertiser's true value would cause later AdX reserves to increase, decreasing that advertiser's future payoff in later AdX auctions.… If the advertiser were aware of RPO, they would have shaded their bid from the beginning."); Pathak Report at ¶ 191 ("Since RPO increased reserve prices dynamically based on past data, the advertisers' bidding patterns now can influence the reserve prices they face in the future. As a result, even though AdX ran a second-price auction at the time, had they known, the advertisers might have wanted to shade their bids, to increase their future payoff by decreasing future reserve prices.").

transactions won by DV360 or Authorized Buyers that occurred between when RPO launched (April 2015[537]) and when it was disclosed (May 2016[538]), and that can be allocated to plaintiff States using Mr. Andrien's method.[539] Next, an internal Google document indicates that DV360 or Authorized Buyers set the clearing price in ██ of those auctions.[540] Multiplying those figures, I calculate that the baseline transaction count for DV360/Authorized Buyers is ███████.

307. In Step 2, I use an analogous method to determine that the baseline transaction count for Google Ads is ██████.[541]

308. In Step 3, I sum the results from Steps 1 and 2 to arrive at a baseline total transaction count of ██████.

309. In Step 4, I calculate an average clearing price of ██████.

310. In Step 5, I estimate a shading factor of █████ by multiplying the assumed amount that advertisers would shade their bids when they *always* pay their bid (████[542]) by the

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[537] ████████████████████████████, Google launched Reserve Price Optimization ("RPO") in April 2015. See Defendant Google LLC's First Amended Responses and Objections to Plaintiffs' Third Set of Interrogatories, May 24, 2024, at 12 ("Reserve Price Optimization launched on or about March 31, 2015. RPO v2 subsequently launched on or about October 5, 2015. Prior versions of RPO were disabled along with the Google Ad Manager switch to first-price auctions in September 2019. In June 2022, Google launched a version of RPO designed for Ad Manager's first-price auction, known as Optimized Pricing, on select web traffic, and it was extended to all web traffic in January 2023." (emphasis omitted)).

[538] See Bellack, Jonathan, "Smarter optimizations to support a healthier programmatic market," *Google Ad Manager Blog*, May 12, 2016,
available at https://blog.google/products/admanager/smarter-optimizations-to-suppor/ (last accessed July 26, 2024) (explaining that RPO [called Optimized pricing in the announcement] "uses historical data to automate the post-auction analysis and updating of floor prices."); see also GOOG-AT-MDL-C-000015606 at -611.

[539] Following Mr. Andrien, when "[the beginning of the penalty period] is after the first day of the month, violation count starts on the first day of the following month; if [the end of the penalty period] is after the first day of the month, violation count ends on the last day of the previous month." Andrien Report Exhibit 4. In this case, this translates in including revenue from April 2015 to April 2016 in the RPO analysis.

[540] See GOOG-DOJ-15719056 at -56. ████████████████████████████████
██
██

[541] I include transactions won by Google Ads because even though RPO did not apply to Google Ads, the clearing price was sometimes set by DV360 and Authorized Buyers, to whom RPO did apply and who, under plaintiffs' theory, would have shaded their bids in the but-for world.

[542] See GOOG-DOJ-05283173 at -179. While shading in first-price auctions leads directly to a reduction in the clearing price in the same auction where the shading occurs, the logic underlying the incentive to shade when AdX uses RPO to set floors is instead based on how shading in a given auction impacts the floor that AdX sets in *future* auctions. Despite this distinction, I adopt Professor Weinberg's approach and assume for purposes of my calculations that the amount of shading is the same. See Weinberg Report at ¶ 275 (arguing that RPO "aims to set the reserve

percentage of AdX auctions where DV360 and Authorized Buyers[543] won the auction and paid the RPO reserve price. Google documents show that, when DV360 and Authorized Buyers won auctions while RPO was in operation, RPO set the clearing price about ▮ of the time.[544] A bidder who expects to pay the amount that it bids ▮ of the time should shade ▮ as much as it would shade if it paid the amount that it bid 100% of the time. Accordingly, I estimate that, according to plaintiffs' theory, DV360 and Authorized Buyers would shade their bids by ▮ in the but-for world absent the alleged deception about RPO.

311.   In Step 6, I multiply the results from Steps 4 and 5 to estimate that, according to plaintiffs' theory, clearing prices would have been ▮ lower in the but-for world absent the deception about RPO.

312.   In Step 7, I multiply the per transaction reduction in clearing price (Step 6) by the baseline total transaction count (Step 3) to determine that, according to plaintiffs' theory, foregone shading resulted in additional gross revenue to Google of ▮.

313.   In Step 8, I calculate the average Google revenue share on those transactions included in the baseline total transaction count (Step 3) to be ▮.

314.   In Step 9, I multiply the increase in Google's gross revenue (Step 7) by the average Google revenue share (Step 8) to calculate that, according to plaintiffs' theory, the alleged deception about RPO increased Google's net revenue by $6,954,078.

315.   Because the transactions considered in these calculations occur in both the actual and but-for worlds, there is no incremental cost associated with them, so according to plaintiffs' theory, Google would have earned $6,954,078 in additional profit due to the alleged deception about RPO.[545]

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price just below what the highest bidder is willing to pay" and that "if AdX has sufficient data to form an accurate prediction of the maximum advertiser value v, the optimal reserve price to set is exactly v").

[543] RPO did not apply to Google Ads. See GOOG-DOJ-13212948. As a result, RPO did not create an incentive for Google Ads to shade.

[544] I conservatively adopt the highest estimate from available documents. ▮

[545] Calculations are contained in folder "DTPA_Incremental_Revenue" of my backup.

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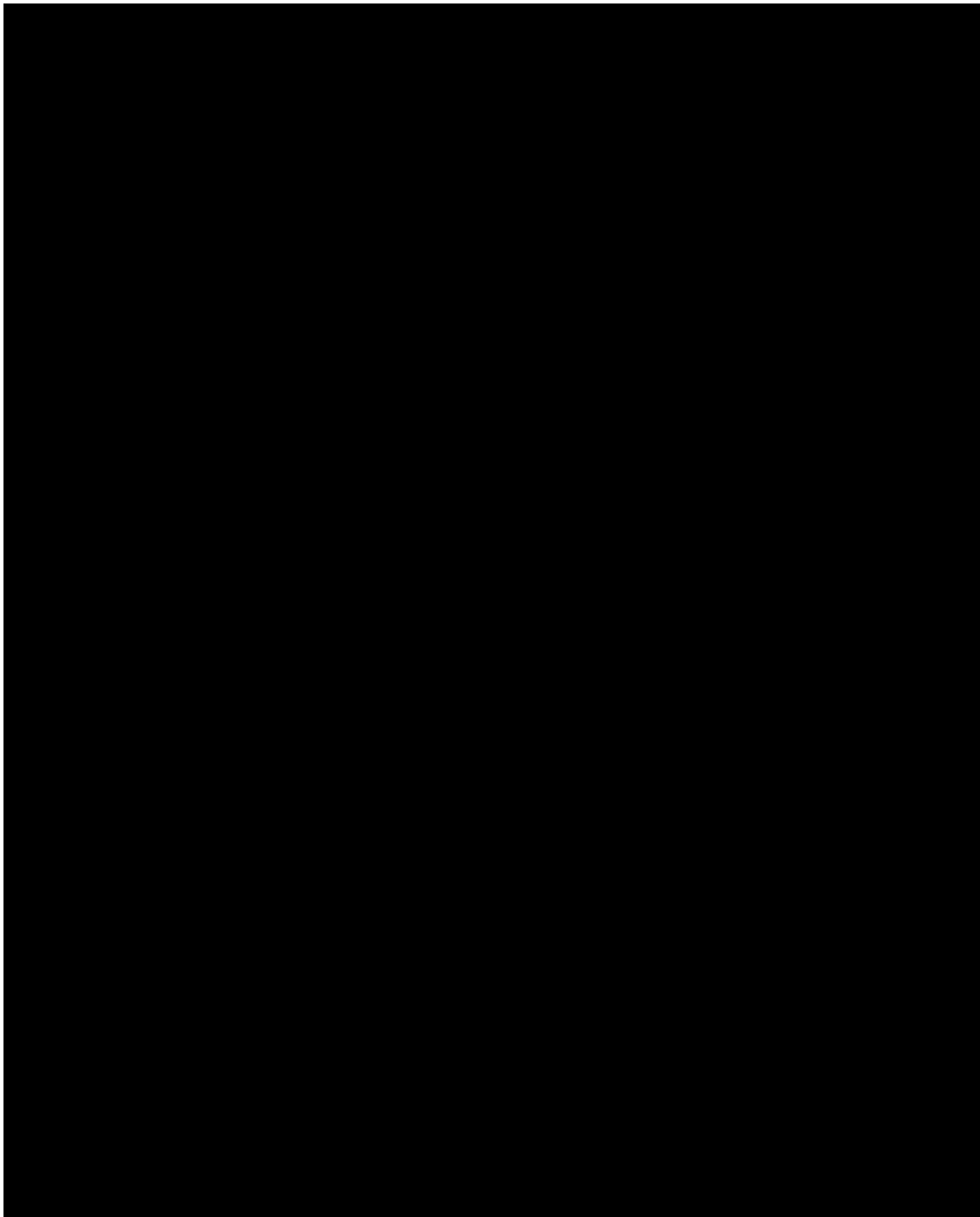
316.   As noted above, this estimate is based on transaction counts from U.S. Open Auctions and allocated to plaintiff States using Mr. Andrien's method. I also calculated how much plaintiffs' theory would predict Google's profits would increase if transaction counts excluded in-app impressions, excluded states that limit recovery to business-to-business transactions, were allocated to the plaintiff States based on advertiser locations, and accounted for statutes of limitations. In that case, as shown in the last column of Table D1, the baseline total transaction count would be ███████, and the increase in Google's profits would be $2,049,015.

317.   Table D5 summarizes the increase in Google's profits from the alleged deception about RPO and other programs (according to plaintiffs' theory) under a range of alternative assumptions about the baseline total transaction count.

318.   All of these estimates are conservative because Step 5 likely overstates the incentive to shade, causing me to overstate the gains to Google from the alleged deception. One reason is that any benefit from shading because of RPO comes from an impact on future price floors, rather than direct returns from the current auction. Because firms discount future benefits and costs, the impact of paying a higher price in the future is smaller than the impact of paying a higher price today.[546] A second reason is that even when RPO affects a

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[546] See, e.g., "Discounting for Public Policy: Theory and Recent Evidence on the Merits of Updating the Discount Rate," *Council of Economic Advisers Issue Brief*, January 2017, available at https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf (last accessed July 25, 2024); see also "The Role of Discount Rates in Cost Benefit Analysis," *Faster Capital*, June 26, 2024, available at https://fastercapital.com/content/The-Role-of-Discount-Rates-in-Cost-Benefit-Analysis.html (last accessed July 25, 2024) ("In the realm of cost-benefit analysis, one crucial factor that plays a significant role is the discount rate.… Put simply, a discount rate is a percentage used to convert future costs and benefits into their present value equivalents. It reflects the time value of money, acknowledging that a dollar received today is worth more than the same dollar received in the future. By discounting future cash flows, analysts can compare and evaluate costs and benefits that occur at different points in time, ensuring a fair and consistent assessment.").

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transaction, the clearing price is less than the winning bid.[547] That fact implies that my estimate of how often advertisers are charged their bid is overstated, which in turn implies that my estimate of shading is overstated. Together these facts mean that advertisers would have less incentive to shade bids than what my methodology implies. And if advertisers shade less than I have assumed, the alleged deception about RPO would generate even lower profits for Google.

b. DRS v1

319.   Plaintiffs' experts theorize that, if advertisers had known about DRS v1, then they would have shaded their bids.[548] In particular, Professor Weinberg theorizes that "when the highest bid is the unique bid above the hard reserve r and below the soft reserve r/0.8, [advertisers] pay their bid,"[549] creating an incentive to shade. This theory implies that the alleged deception regarding DRS v1 caused clearing prices for some auctions to be higher than they would have been in the but-for world, leading to increased Google profits from this "price effect".

320.   I calculated the incremental Google profit from the alleged deception about DRS v1 using the nine-step methodology described above. Each of the steps is described below and summarized in the second-to-last column of Table D2.

321.   In Step 1, I begin by determining from Google data that there were ▮▮▮▮▮▮▮▮ transactions won by DV360 and Authorized Buyers that occurred when DRS v1 was in effect (between August 2015 and November 2016[550]), and that were allocated to plaintiff

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[547] ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

[548] See Weinberg Report at ¶ 227 ("[C]oncealing DRSv1 caused advertisers to bid their true value in a non-truthful auction, whereas advertisers would get higher a higher gain by shading their bids."); *id.* at ¶ 228 ("By not revealing DRSv1 to the advertisers, Google made material gains. This is because if advertisers were to shade their bids, which is the natural bidding behavior in a non-truthful auction like DRSv1, this would lead to less revenue for both AdX and publishers. However, advertisers likely did not shade their bids, since Google never publicly revealed DRSv1."); see also Pathak Report at ¶ 188 ("Google never disclosed this conduct [DRS v1] to advertisers or publishers who sell or buy impressions through AdX. This is partially because, in the auctions where AdX decreases its take rate, the advertisers are charged their bid, akin to a first-price auction. If the advertisers knew this was a possibility, they would shade their bids in such a situation. This would suppress the bids, reducing AdX revenue, since AdX takes a percentage of the clearing price as its fee. As a result, Google chose to not reveal DRSv1 to its customers, enabling AdX to increase its win rate without facing the repercussions of shaded bids.").

[549] Weinberg Report at ¶ 195.

[550] I follow Mr. Andrien's approach with respect to the penalties period for DRS v1. See Andrien Report Exhibit 7.

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States using Mr. Andrien's method. Next, an internal Google document indicates that DV360 bidders or Authorized Buyers set the clearing price in ████ of auctions.[551] I then calculate that the baseline transaction count for DV360/Authorized Buyers is ███████.

322.   In Step 2, I use an analogous method to determine that the baseline transaction count for Google Ads is ███████.

323.   In Step 3, I sum the results from Steps 1 and 2 to arrive at a baseline total transaction count of ███████.

324.   In Step 4, I calculate an average clearing price of ██████.

325.   In Step 5, I estimate a shading factor of █████ by multiplying the assumed amount that advertisers would shade their bids when they *always* pay their bid (████[552]) by the percentage of AdX auctions where Authorized Buyers and DV360 paid their bids.[553] An internal Google document indicates that DRS v1 charged Authorized Buyers and DV360 winning advertisers their bids in queries representing █████ of revenue.[554] A bidder who expects to pay the amount that it bids █████ of the time should shade ██████ as much as if it paid the amount that it bid 100% of the time. Accordingly, I estimate that, according to plaintiffs' theory, DV360 and Authorized Buyers would shade their bids by ████████ ███████ in a but-for world absent the alleged deception about DRS v1.

326.   In Step 6, I multiply the results from Steps 4 and 5 to estimate that, according to plaintiffs' theory, clearing prices would have been ███████ lower in the but-for world absent the alleged deception about DRS v1.

327.   In Step 7, I multiply the per-transaction reduction in gross clearing price (Step 6) by the transaction count (Step 3) to determine that, according to plaintiffs' theory, foregone

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[551] See GOOG-DOJ-15719056 at -056. ████████████████████████████████
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██ t.

[552] See GOOG-DOJ-05283173 at -179.
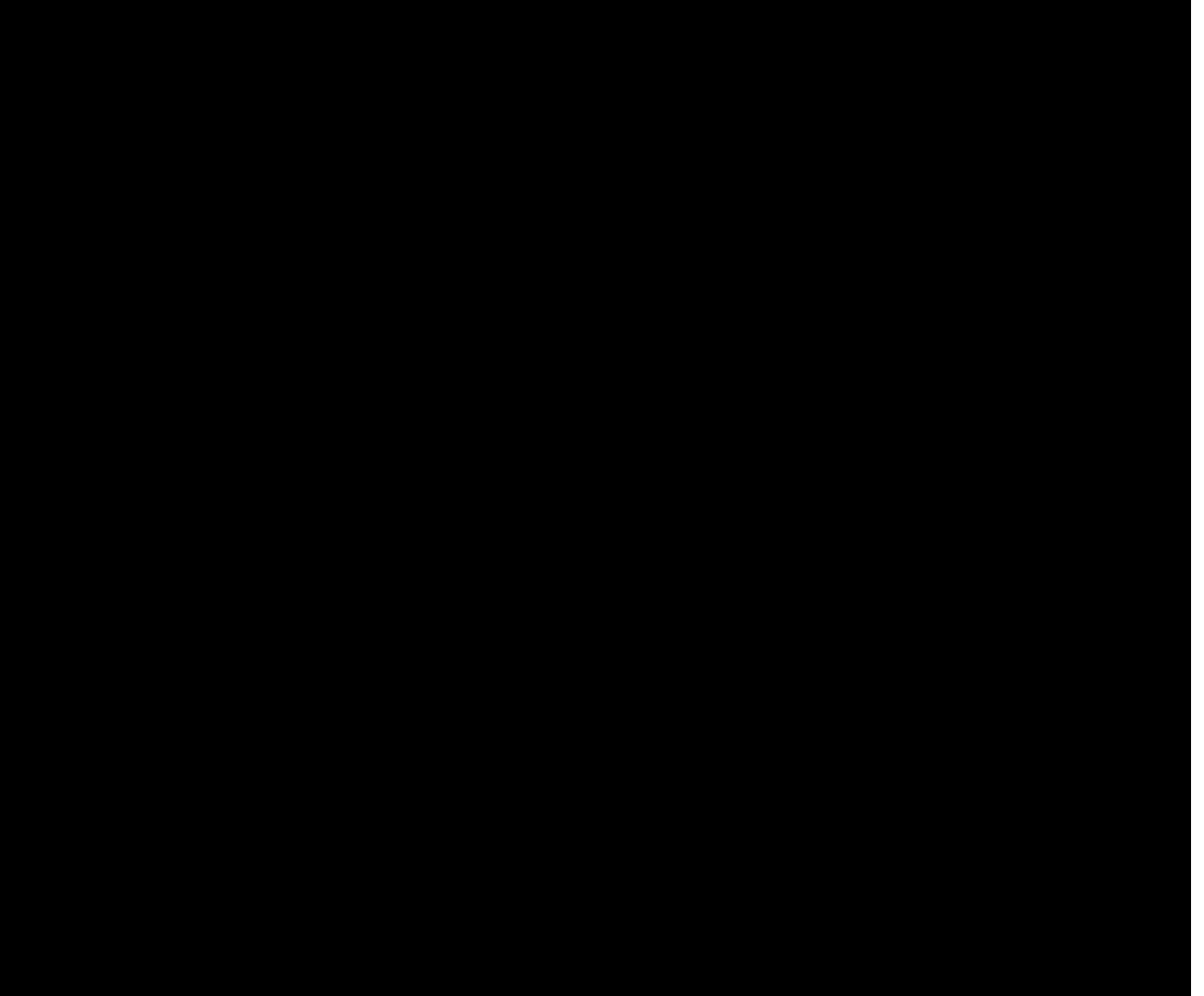
[553] Google Ads was exempt from DRS v1. GOOG-DOJ-15068390 at -391 ("This launch applies to AdX buyers (incl. DBM) on AdX sellers: … AdWords (GDN): N[o]").

[554] See GOOG-AT-MDL-007375273 at -273. At the time, DRSv1 applied to both Authorized Buyers and DV360 and I interpret the reference to "RTB buyers" in this particular document to include both Authorized Buyers and DV360. The document shows that █████ of revenue was associated with bids in the dynamic region (bids where the buyer paid the amount of its bid). Professor Weinberg agrees that, when the bid was in the dynamic region, advertisers paid their bid. See Weinberg Report at ¶ 195 ("[W]hen the highest bid is the unique bid above the hard reserve r and below the soft reserve r/0.8, they win and pay their bid.").

shading resulted in additional gross revenue to Google of ██████████ .

328.   In Step 8, I calculate the average Google revenue share on those transactions included in the baseline total transaction count (Step 3) to be ████ .

329.   In Step 9, I multiply the increase in Google's gross revenue (Step 7) by the average Google revenue share (Step 8) to calculate that, according to plaintiffs' theory, the alleged deception about DRS v1 increased Google's net revenues by $4,656,540.

330.   Because these transactions occur in both the actual and but-for worlds, there is no incremental cost associated with them, so according to plaintiffs' theory Google would have earned $4,656,540 in additional profit due to the alleged deception about DRS v1.[555]

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[555] Calculations are contained in folder "DTPA_Incremental_Revenue" of my backup.
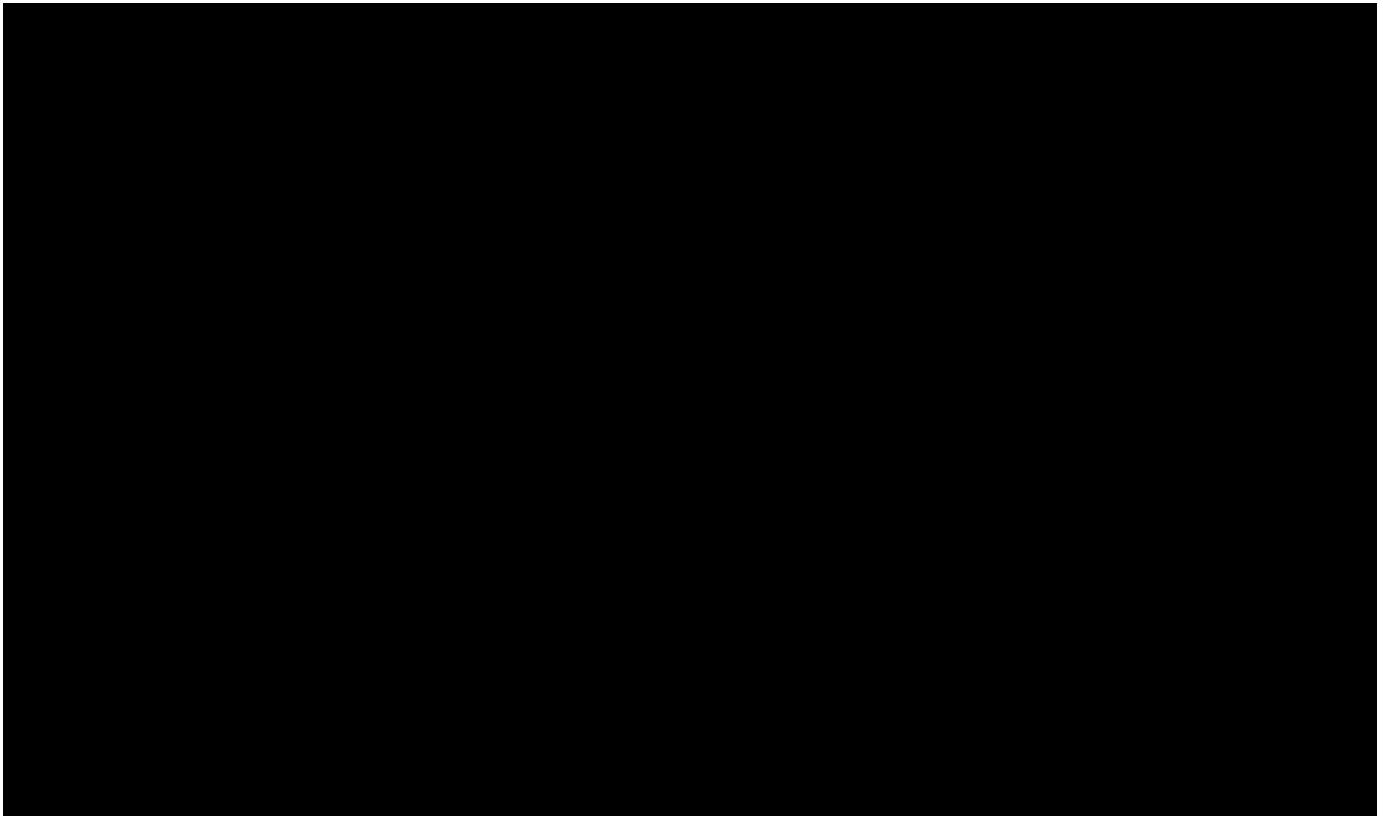
331. This estimate is based on transaction counts from U.S. Open Auctions and allocated to plaintiff States using Mr. Andrien's method. I also calculated how much plaintiffs' theory would predict Google's profits would increase if transaction counts excluded in-app impressions, excluded states that limit recovery to business-to-business transactions, were allocated to the plaintiff States based on advertiser locations, and accounted for statutes of limitations. In that case, as shown in the last column of Table D2, the baseline total transaction count would be ████████, and the increase in Google's profits would be $1,339,893.

332. Plaintiffs' experts also theorize that the alleged deception regarding DRS v1 prevented publishers from optimally adjusting their price floors.[556] I discussed why I do not attempt to measure the impact of such changes in price floors on Google profit in the introduction to Part 1 of this Appendix. In addition to the reasons discussed there, in the case of DRS v1, the available evidence indicates that any such effects on price floors would be

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[556] See Weinberg Report at ¶ 219 ("Google concealed material information from publishers by not disclosing the implementation of DRSv1. Since publishers believed that AdX runs a regular second-price with their given reserve price and a static take rate of 20%, a strategic publisher would set a price floor that maximized their revenue under these circumstances. Had they known AdX dynamically adjusted its take rate, publishers would set different price floors.").

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small.[557],[558]

333.   Table D5 summarizes the increase in Google's profits from the alleged deception about
DRS v1 and other programs (according to plaintiffs' theory) under a range of alternative
assumptions about the baseline total transaction count.

c. *Project Bernanke*

334.   Similar to RPO and DRS v1, plaintiffs' experts theorize that if advertisers had known
about Bernanke, then they would have reduced their bids—or more accurately, their
MaxCPC, which forms the basis of the bids that Google Ads placed in the AdX auction on
their behalf.[559],[560] According to plaintiffs' theory, Bernanke makes it optimal for
advertisers to reduce their MaxCPC because Bernanke sometimes results in advertisers
paying their bid.[561] This theory implies that the alleged deception about Bernanke caused

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[557] ███
██ For example, Professor
Weinberg argues that "if the publisher knew that the take-rate could go down to 19% on average," the publisher could
respond by increasing the floor price. In particular, if *r* is the optimal publisher floor without DRS and r' is the
optimal publisher floor with DRS v1, then the publisher could set the floor with DRS v1 such that: $r'/81\% = r/80\%$.
See Weinberg Report at ¶ 219, footnote 333. This means that, in a but-for world where publishers responded to a
disclosure of DRS v1, price floors would be only 1.25% (81%/80% - 1) higher than in the actual world.

[558] I also note that DRS v1 was mainly used to overcome publisher-set floors that were too high (rather than floors
determined by header bidding, which would generally compete with AdX through the DA/EDA floor). As a result, it
is unlikely that publishers would find it optimal to increase floors. See GOOG-AT-MDL-007375273 at -273
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███████████████
      ██ See *ibid*.
██
██████ See *ibid*.; see also August 4, 2023 ██████ Declaration at ¶ 32 ("In most cases when DRS applied,
the reserve price was set by the publisher-set floor price.").

[559] See Weinberg Report at ¶¶ 258-261 ("Advertisers would have shaded their bids to maximize their payoff had they
known about Projects Bernanke and Global Bernanke … Provided that neither Project Bernanke nor Project Global
Bernanke were disclosed to advertisers, they would naturally believe they were still participating in a truthful second-
price auction and bid their true value as a result. If advertisers knew they were participating in a non-truthful auction,
they would have instead considered shading their bids."); see also Pathak Report at ¶ 183 ("If Google Ads announced
[Bernanke] to the public … advertisers would shade their bids.").

[560] As I explain in Section II.A, it is incorrect to think of Google Ads advertisers as submitting "bids." When
advertisers pay on a CPC or CPA basis, as most Google Ads advertisers do, the advertiser sets up budgets,
constraints, and objectives, commonly including a maximum cost-per-click (CPC) or maximum cost-per-action
(CPA) that it is willing to pay; but the advertiser does not bid in an auction nor specify CPM-based bid amounts
(which compete on a CPM basis).

[561] GOOG-DOJ-AT-02467209 at -209.

clearing prices for some auctions to be higher than they would have been in the but-for world, leading to increased Google profits from this "price effect."

335.   I calculated the incremental Google profit from the alleged deception about Bernanke using the same nine-step methodology described above. Each of the steps is described below and summarized in the second-to-last column of Table D3.

336.   In Step 1,[562] I begin by determining from Google data that there were ▮▮▮▮▮ transactions won by DV360 bidders and Authorized Buyers during the period between November 2013 and October 2019 and that were allocated to plaintiff States using Mr. Andrien's method. Next, I calculate that Google Ads bidders set the clearing price in ▮▮▮ of these transactions.[563] Multiplying those figures, I calculate that the baseline transaction count for DV360/Authorized Buyers is ▮▮▮▮▮▮.

337.   In Step 2, I use an analogous method to determine that the baseline transaction count for Google Ads is ▮▮▮▮▮▮.

338.   In Step 3, I sum the results from Steps 1 and 2 to arrive at a baseline total transaction

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[562] For both Steps 1 and 2 it is important to note that, before AdX adopted a first-price format there were two different versions of Bernanke that have a material impact on transaction counts. The first version of Bernanke, which was introduced in November 2013, applied to all Google Ads advertisers. As a result, from November 2013 to March 2016, I include all transactions in which a Google Ads advertiser set the clearing price. However, beginning in April 2016 and continuing through September 2019, this first version of Bernanke applied only to a relatively small number of advertisers who were not using some form of automated bidding tool. See GOOG-DOJ-AT-02467209 "Do not first-price conversion optimizer ads on ▮▮▮▮▮ and AdX. Instead charge the minimum price needed to win the query. No change for non-CO ads.…We propose that for CO [Conversion Optimizer] advertisers (tCPA, fixed CPA, ROAS) gTrade should charge the minimum price to win the query, which makes the traffic look like regular second price auction."). Advertisers who were using automated bidding tools operated under a second form of Project Bernanke that did *not* give them an incentive to lower their bids (i.e., it was "truthful"). See GOOG-DOJ-AT-02467209. Accordingly, even if this form of Bernanke had been disclosed, advertisers who were using automated bidding tools would not have had an incentive to bid less than they did in the actual world, so during the period between April 2016 and September 2019, I include only auctions in which those few advertisers who were not using automated bidding set the clearing price. The percentage of Google Ads revenue where the advertiser used autobidding is estimated using data produced by Google. See GOOG-AT-DOJ-DATA-000011657 to GOOG-AT-DOJ-DATA-000012656; see also Letter from D. Pearl to W. Noss and Z. DeRose, "Re Data Dictionaries," May 3, 2024. When AdX adopted a first-price auction format in September 2019, Bernanke was replaced by Alchemist, also at times referred to as first-price Bernanke. See Bigler, Jason, "Rolling out first price auctions to Google Ad Manager partners," *Google Ad Manager Blog*, September 5, 2019, available at https://blog.google/products/admanager/rolling-out-first-price-auctions-google-ad-manager-partners/ (last accessed July 25, 2024). Alchemist is also truthful, so Google Ads advertisers did not have an incentive to shade their bids after it went into effect. As a result, I do not include any transactions after September 2019.

[563] ▮▮.

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count of ▉▉▉▉▉.

339.   In Step 4, I calculate an average clearing price of ▉▉▉▉.

340.   In Step 5, I estimate a shading factor of ▉▉▉ by multiplying the assumed amount that advertisers would shade their bids when they *always* pay their bid (▉▉▉[564]) by the percentage of AdX auctions where Google Ads advertisers[565] paid their bids. An internal Google document indicates that Bernanke charged Google Ads bidders their bid on ▉▉▉ of queries.[566] A bidder who expects to pay the amount that it bids ▉▉▉ of the time should shade ▉▉▉ as much as if it paid the amount it bid 100% of the time. Accordingly, I estimate that, according to plaintiffs' theory, Google Ads bidders would shade their bids by ▉▉▉▉▉▉▉ in a but-for world absent the alleged deception about Bernanke.

341.   In Step 6, I multiply the results from Steps 4 and 5 to estimate that, according to plaintiffs' theory, clearing prices would have been ▉▉▉▉ lower in the but-for world absent the alleged deception about Bernanke.

342.   In Step 7, I multiply the per transaction reduction in clearing price (Step 6) by the baseline total transaction count (Step 3) to determine that, according to plaintiffs' theory, foregone shading resulted in additional gross revenue to Google of ▉▉▉▉▉.

343.   In Step 8, I calculate the average Google revenue share on those transactions included in the baseline total transaction count (Step 3) to be ▉▉▉▉.

344.   In Step 9, I multiply the increase in Google's gross revenue (Step 7) by the average Google revenue share (Step 8) to calculate that, according to plaintiffs' theory, the alleged deception about Bernanke increased Google's net revenue by $24,829,034.

345.   Because the transactions considered in these calculations occur in both the actual and but-for worlds, there is no incremental cost associated with them, so according to plaintiffs' theory, Google would have earned $24,829,034 in additional profit due to the alleged deception about Bernanke.[567]

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[564] See GOOG-DOJ-05283173 at -179.

[565] Project Bernanke only applied to Google Ads, and did not apply to DV360 or Authorized Buyers.

[566] GOOG-DOJ-AT-02467209 at -209.

[567] Calculations are contained in folder "DTPA_Incremental_Revenue" of my backup.

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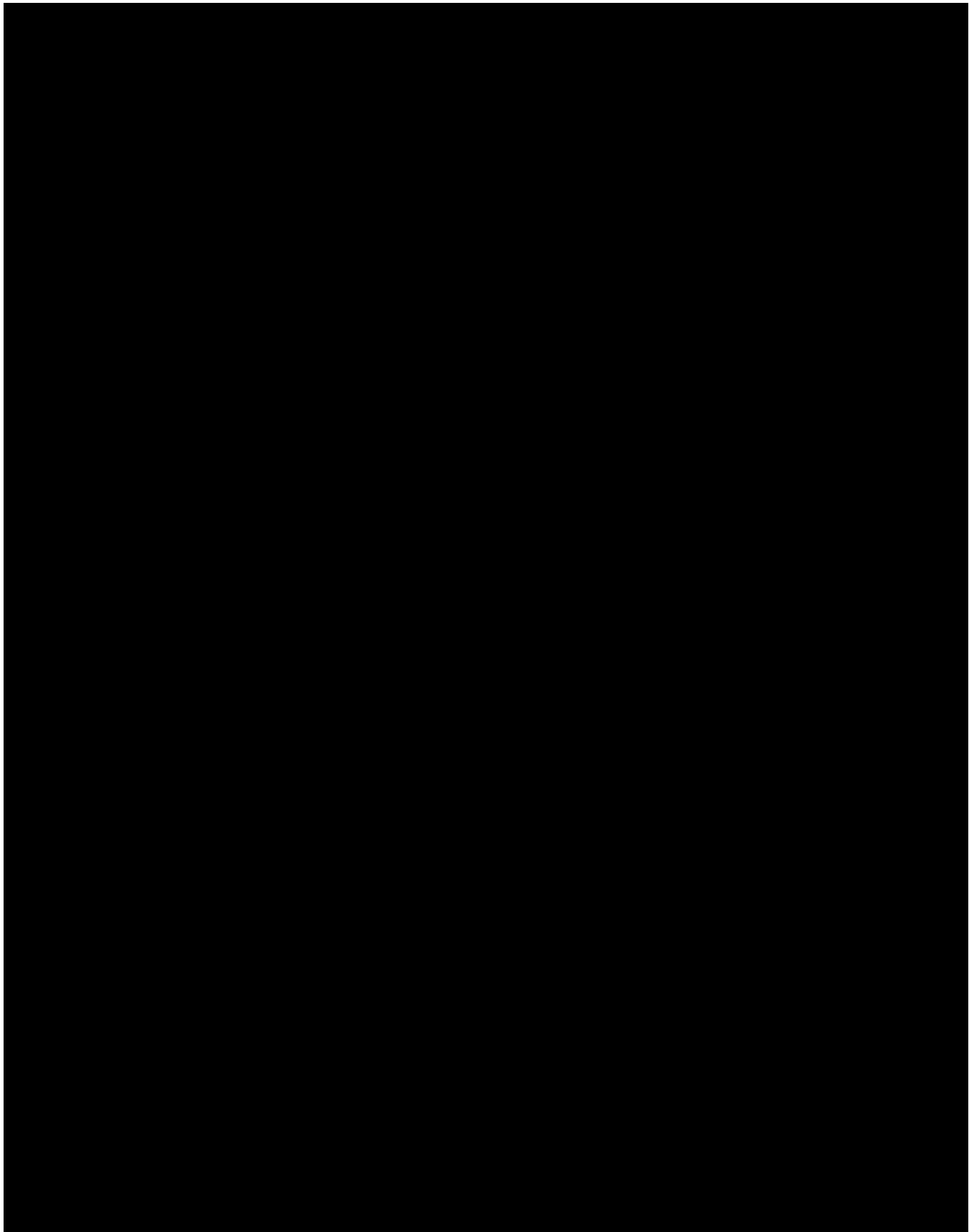
346.   As noted above, this estimate is based on transaction counts from U.S. Open Auctions and allocated to plaintiff States using Mr. Andrien's method. I also calculated how much plaintiffs' theory would predict Google's profits would increase if transaction counts excluded in-app impressions, excluded states that limit recovery to business-to-business transactions, were allocated to the plaintiff States based on advertiser locations, and accounted for statutes of limitations. In that case, as shown in the last column of Table D3, the baseline total transaction count would be   , and the increase in Google's profits would be $14,359,456.

347.   Table D5 summarizes the increase in Google's profits from the alleged deception about Bernanke and other programs (according to plaintiffs' theory) under a range of alternative assumptions about the baseline total transaction count.

2. Advertiser Responses to DRS v2 That Could Have Generated Incremental Google Profit Through Quantity Effects

348.   Professor Weinberg theorizes that "[i]f all advertisers responded optimally to DRSv2, no advertiser would bid in the dynamic region, and therefore DRSv2 would be equivalent to no DRS. That is, exactly the same advertisers would win exactly the same impressions and pay exactly the same amount and the entire DRSv2 program would be obviated."[568] In other words, Professor Weinberg theorizes that the transactions that occur in the dynamic region—the region "between the publisher-set reserve of r and the effective reserve of

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[568] Weinberg Report at ¶ 226; see also Andrien Report at ¶ 110 ("Google directly benefits from its misconduct every time an auction clears on AdX that would not have cleared but-for the misconduct, or if the clearing price was higher than it would have been absent the misconduct. For example, each time an auction cleared in AdX because Google used DRS to adjust its take rate, Google directly benefited because it earned a fee that it would not have earned without employing DRS.").

r/0.8"[569]—reflect incremental transactions due to the alleged deception. This theory implies that the alleged deception about DRS v2 caused more transactions to clear on AdX in the actual world than in the but-for world absent the alleged deception, leading to increased Google profits from a "quantity effect."

349.   I calculated the incremental Google profit from the alleged deception about DRS v2 using a seven-step methodology. Each of the steps is described below and summarized in the second-to-last column of Table D4.

350.   Step 1: I begin by determining from Google data that there were ▮▮▮▮▮ transactions won by Authorized Buyers[570] between when DRS v2 launched (December 2016) and when it was replaced by tDRS (July 2018)[571] that were allocated to plaintiff States using Mr. Andrien's method.

351.   Step 2: Based on an internal Google document, I calculate that DRS v2 lowered AdX's revenue share in ▮▮▮ of the transactions won by Authorized Buyers where the winning bid was in the "dynamic region."[572]

352.   Step 3: I multiply the number of transactions won by Authorized Buyers (Step 1) by the percentage of those transactions with winning bids in the "dynamic region" (Step 2) to determine that, according to plaintiffs' theory, there were ▮▮▮▮▮ incremental

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[569] Weinberg Report at ¶ 206.

[570] I exclude transactions won by Google Ads and DV360 because DRS v2 did not apply to them. See Email from ▮▮▮▮▮ (Google), "Fwd: [Monetization-pm] [drx-pm] LAUNCHED! AdX Dynamic Revenue Share (DRS)," September 11, 2015, GOOG-DOJ-15068390 at -291; Email from ▮▮▮▮▮ "[Launch 145022] Dynamic Revshare v2 on Ad Exchange for AdX Buyers," March 10, 2016, GOOG-DOJ-14717283 at -283; Email from ▮▮▮▮▮ "OVERDUE LAUNCH – Please update: [Launch 169646] Remove DBM from AdX dynamic revshare," November 9, 2016, GOOG-DOJ-14734878 at -878.

[571] See Andrien Report Exhibit 7 at 128. I include transactions occurring over this time period even though Professor Weinberg acknowledged that "Google announced DRSv2 when it was launched" and "the publishers were allowed to opt out of DRSv2." Weinberg Report at ¶ 197. In particular, on June 13, 2016, before it launched DRS v2, Google announced that, "[a]s part of our ongoing efforts to provide smarter optimizations and maximize revenue, *we may increase or decrease revenue share per query*. If you'd prefer to apply your contracted revenue share on every query, use the new Ad Exchange UI Admin control to exclude all the sites you monetize through your account from revenue share-based optimizations." See "2016 releases archive: DoubleClick for Publishers and Ad Exchange Seller," *Google Ad Manager Help*, June 13, 2016, available at https://support.google.com/admanager/answer/7421657?sjid=10086602547051235141-NA#zippy=%2Cjune-change-history-update-safeframe-for-creative-types-deal-check-bid-filter-apply-per-query-revenue-share-optimization (last accessed July 25, 2024) (under the Q2 2016 Ad Exchange release stating "New Ad Exchange control for applying per-query revenue share optimization" (emphasis added)); see also GOOG-AT-MDL-C-000015769 at -779.

[572] See GOOG-AT-MDL-007375273 at -273. ▮▮▮▮▮

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transactions generated by the alleged deception about DRS v2.

353.   Step 4: I compute the average clearing price for those incremental transactions to be ███████.[573]

354.   Step 5: I estimate the per-transaction gross revenue to Google for these incremental transactions as ███████. Professor Weinberg contends that the "effective price" bidders pay on these transactions is the "effective reserve," which he calculates as the reserve price divided by 80% (i.e., the reserve price adjusted to account for AdX's standard 20% revenue share).[574] While I do not have information on the relevant reserve prices, I use the observed clearing price as a proxy for the reserve price and divide by 80% to arrive at my estimate of ███████ per transaction in gross revenue to Google for incremental transactions.[575]

355.   Step 6: I multiply the per-transaction gross revenue (Step 5) by 20%, which is the standard AdX revenue share, to estimate that the net revenue to Google is ███████ per transaction.

356.   Step 7: I multiply the number of incremental transactions (Step 3) by the per-transaction net revenue (Step 6) to determine that, according to plaintiffs' theory, the alleged deception about DRS v2 increased Google's net revenue by $6,981,142.

357.   Under the conservative assumption that Google did not incur any incremental costs as a result of the incremental ███████ transactions, Google would have earned $6,981,142 in additional profit due to the alleged deception about DRS v2.[576]

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[573] I calculate clearing price as the ratio of gross revenue and number transactions won by Authorized Buyers.

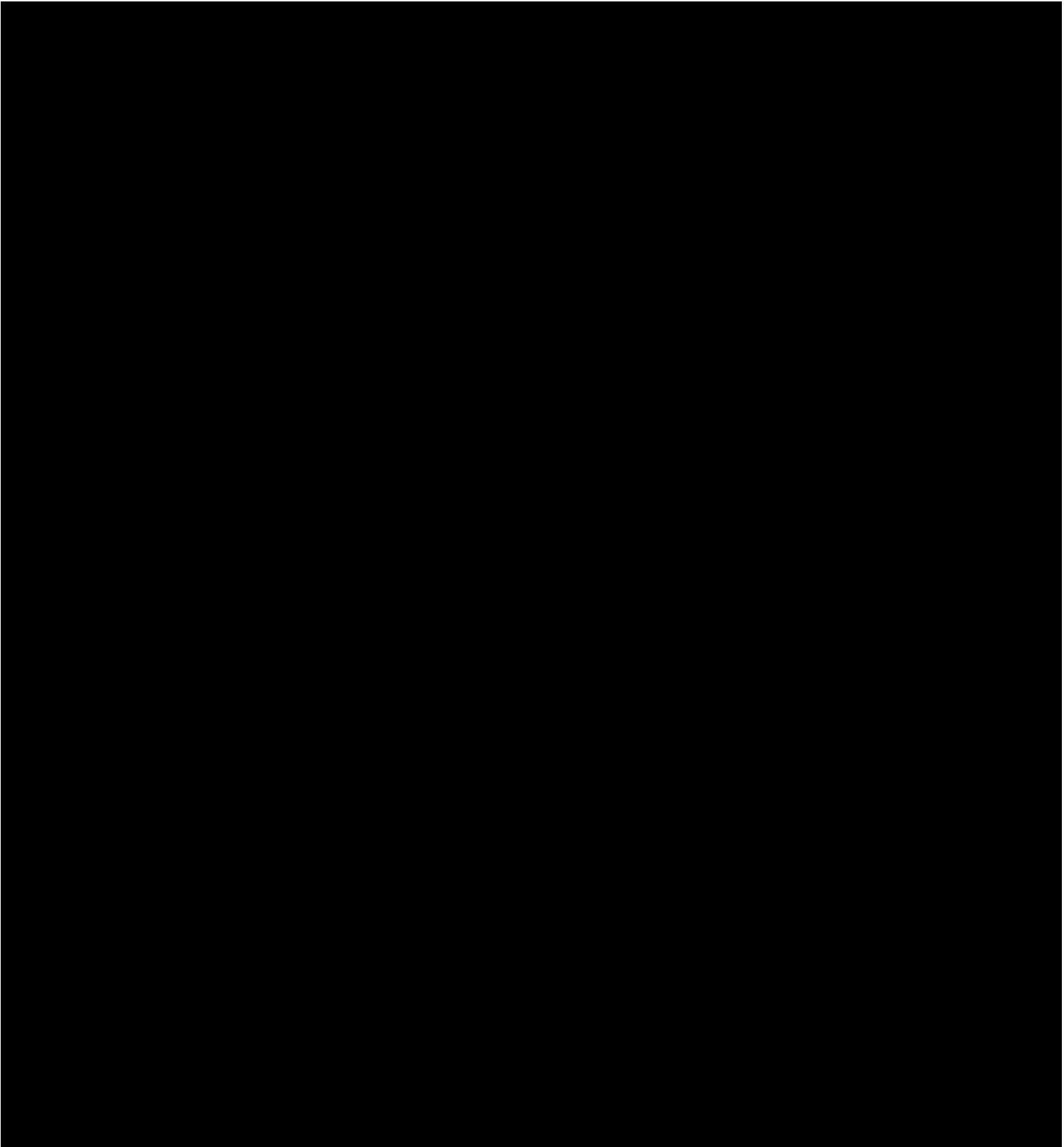[574] Weinberg Report at ¶ 206 (explaining that due to DRS v2's "debt mechanism … when an advertiser submits a winning bid in the 'dynamic region' (i.e., a bid between the publisher-set reserve of r and the effective reserve of r/0.8), the advertiser not only pays their bid now resulting in a payoff of 0, but further accumulates debt that must be paid later."). Professor Weinberg shows that the "effective" clearing price "is r/0.8, the effective reserve, which strictly exceeds the winning bidder's bid." *Id.* at ¶ 206(d)(ii). In other words, when AdX wins an auction because of DRS v2, the winning bidder pays its bid, but also accumulates a debt so that, "assuming that all debt is eventually cleared" the effective price is higher than its bid and equals the effective reserve price r/0.8. *Id.* at ¶ 206.

[575] This is likely to be conservative because, in every auction, the clearing price is at least as high as the auction floor (and thus the price I use in my calculations may exceed the floor).

[576] Calculations are contained in folder "DTPA_Incremental_Revenue" of my backup.

358.   As noted above, this estimate is based on transaction counts from U.S. Open Auctions and

allocated to plaintiff States using Mr. Andrien's method. I also calculated how much

plaintiffs' theory would predict Google's profits would increase if transaction counts

excluded in-app impressions, excluded states that limit recovery to business-to-business transactions, were allocated to the plaintiff States based on advertiser locations, and accounted for statutes of limitations.[577] In that case, as shown in the last column of Table D4, the baseline total transaction count would be ▮▮▮▮▮▮, and the increase in Google's profits due to the alleged deception would be $3,975,659.

359.   Table D5 summarizes the increase in Google's profits from the alleged deception about DRS v2 and other programs (according to plaintiffs' theory) under a range of alternative assumptions about the baseline total transaction count.

360.   Plaintiffs' experts theorize that the alleged deception regarding DRS v2 also misled publishers, though they stop short of describing how publishers would have set floor prices differently in the but-for world.[578] To the extent that plaintiffs believe that publishers would have changed price floors in the but-for world, I discussed why I do not attempt to measure the impact of such changes in price floors in the introduction to Part 1 of this Appendix. In addition to those reasons, in the case of DRS v2, the available evidence indicates that any effects from these publisher responses would be small because, as noted above, publishers (and advertisers) were informed about DRS v2 before it was launched, and publishers were allowed to opt out of DRS v2.[579]

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[577] In applying States' statutes of limitations, I conservatively assume that the deception was revealed in October 2021 with the unsealing of the complaint, which implies that no states are time-barred from recovering penalties. As discussed above in Section IV.E.c, Google publicly announced on its Google Ad Manager Help website in June 2016 that "we may increase or decrease revenue share per query", which is the key mechanist behind DRS v2. "2016 releases archive: DoubleClick for Publishers and Ad Exchange Seller," *Google Ad Manager Help*, June 13, 2016, available at https://support.google.com/admanager/answer/7421657?sjid=10086602547051235141-NA#zippy=%2Cjune-change-history-update-safeframe-for-creative-types-deal-check-bid-filter-apply-per-query-revenue-share-optimization. (last accessed July 25, 2024) (under the Q2 2016 Ad Exchange release stating "New Ad Exchange control for applying per-query revenue share optimization"). Therefore, the deception ended even before DRS v2 started, in which case there would be not incremental revenue related to the deception.

[578] See Andrien Report at ¶ 42 ("The same is true of DRSv2. I understand that some aspects of DRSv2 were misleading to advertisers and publishers based, in part, on Google's omissions in clearing disclosing the concept of debt with DRSv2, which mislead both advertisers and publishers regarding how much they are paying or paid out, prevented them from employing optimal bidding strategies, and obscured feedback to advertisers."); Weinberg Report at ¶ 231(b) ("For DRSv2, Google states: 'sellers are always paid at least their reserve.' I find this claim misleading to publishers.").

[579] Professor Weinberg acknowledges that "Google announced DRSv2 when it was launched" and "the publishers were allowed to opt out of DRSv2." Weinberg Report at ¶ 197. In particular, on June 13, 2016, before it launched DRS v2, Google announced that, "[a]s part of our ongoing efforts to provide smarter optimizations and maximize revenue, *we may increase or decrease revenue share per query*. If you'd prefer to apply your contracted revenue share on every query, use the new Ad Exchange UI Admin control to exclude all the sites you monetize through your account from revenue share-based optimizations." "2016 releases archive: DoubleClick for Publishers and Ad

3.   Summary of Incremental Google Profit Due to the Alleged Deception

361.   The final row in Table D5 below summarizes the results discussed in this Appendix, and other rows summarize results based on alternative assumptions about the appropriate transaction counts to use as the basis for each calculation.
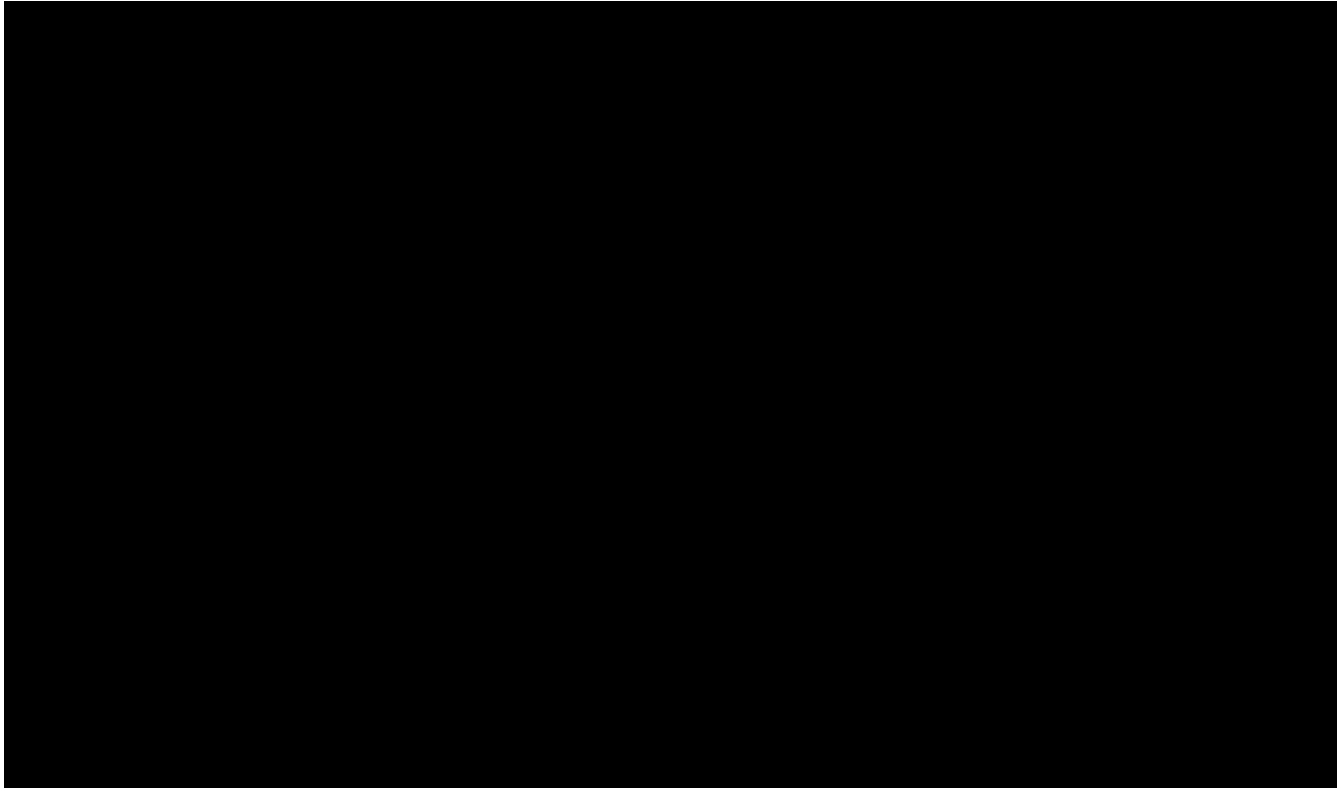
Exchange Seller," *Google Ad Manager Help*, June 13, 2016, available at https://support.google.com/admanager/answer/7421657?sjid=10086602547051235141-NA#zippy=%2Cjune-change-history-update-safeframe-for-creative-types-deal-check-bid-filter-apply-per-query-revenue-share-optimization. (last accessed July 25, 2024) (under the Q2 2016 Ad Exchange release stating "New Ad Exchange control for applying per-query revenue share optimization") (emphasis added). Similarly, a presentation for publishers dated December 2016 included a slide explaining that "[r]evenue share based optimizations help publishers make more revenue by adjusting Google's revenue share *up or down* to increase winrate." GOOG-DOJ-03071474 at -476 (emphasis added). While this presentation included an example where "RSBO" (which appears to be an alternative Google name for DRS v2) reduced AdX's revenue share to 11 percent, the speaker notes explain that "[i]n other queries RSBO might increase the rev share." *Id.* at -477. Finally, Google offered publishers alternative options concerning how they would be billed for their contracted AdX revenue share, which implicitly revealed that the revenue share could be above or below 20% (or the publisher-specific contracted share). In particular, publishers could opt to pay the contracted revenue share (i) on a "per query" basis, or (ii) on average over all queries during each billing period. See GOOG-DOJ-14718514. When offered this choice, at least some publishers would logically conclude that, under the second option, the AdX revenue share could differ across individual queries, but both options would have the same revenue share on average. In other words, under the "per query" option, deviations from the contracted revenue share would be zero, and under the second option, the revenue share could be higher than the contracted rate on some queries and lower on others. Publishers that realized this simple implication of the two options would not have been deceived.

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Appendix E: Statutes of Limitations for DTPA Claims

362.   I understand that the plaintiff States' respective statutes of limitations define intervals of time following disclosures of the challenged programs during which DTPA violations can be alleged and penalties claimed.

363.   Counsel for Google has provided me the information reported in Table E1 below. I used that information to determine which states can claim DTPA civil penalties for the alleged deception about each of the programs at issue, based on the time the alleged deception ended and the "critical date" from the table. In particular, if $d(p)$ is the month when the alleged deception pertaining to program p ended, and $c(s)$ is the plaintiff States (s)'s critical date reported in the table below:

       a.   If $d(p) \geq c(s)$, then state s can claim penalties for the alleged deception related to program p.

       b.   If $d(p) < c(s)$, then state s cannot claim penalties for the alleged deception related to program p.

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Table E1
DTPA Statutes of Limitations

Plaintiff State	DTPA Statute of Limitations	Basis for DTPA Statute of Limitations	Critical Date[1]
Alaska	6 years	AS § 09.10.120; *see also* Pls.' Appendix A[2] at 1	12/16/2014
Arkansas	5 years	Ark. Code Ann. § 4-75-217(a); *see also* Pls.' Appendix A at 1	12/16/2015
Florida	4 years	Fla. Stat. Ann. § 501.207(5)	12/16/2016
Idaho	4 years	Idaho Code § 5-224; *see also* Pls.' Appendix A at 1	12/16/2016
Indiana	2 years	Ind. Code § 24-5-0.5-5(b); *see also* Pls.' Appendix A at 1-2	12/16/2018
Kentucky	2 years	Ky. Rev. Stat. § 367.220(5)	12/16/2018
Missouri	3 years	Mo. Ann. Stat. § 516.130(2)	12/16/2017
Montana	2 years	Mont. Code Ann. § 27-2-211; *see also* Pls.' Appendix A at 2-3	12/16/2018
Nevada	4 years	Nev. Rev. Stat. § 11.190(2)(d)(2017); *see also* Pls.' Appendix A at 3	12/16/2016
North Dakota	2 years	N.D. Cent. Code Ann. § 28-01-18(2)	12/16/2018
Puerto Rico	4 years	10 L.P.R.A. § 268(c); *see also* Pls.' Appendix A at 3	12/16/2016
South Carolina	3 years	S.C. Code § 39-5-150; *see also* Pls.' Appendix A at 3-4	12/16/2017
South Dakota	4 years	SDCL § 37-24-33; *see also* Pls.' Appendix A at 4	12/16/2016
Utah	5 years	Utah Code § 13-2-6(6)(b); *see also* Pls.' Appendix A at 4	12/16/2015

Notes: [1] This table does not address statutes of limitations applicable to DTPA claims under Louisiana, Mississippi, or Texas law. [2] For each state, a "Critical Date" is calculated as the date corresponding to the number of years prior to the filing date of Plaintiff States' original complaint (December 16, 2020) that is equal to the length of that state's statute of limitations for DTPA claims. If allegedly deceptive conduct was publicly disclosed prior to a Plaintiff State's Critical Date, then that plaintiff State should not be able to recover civil penalties based on that conduct under that Plaintiff State's DTPA. [3] "Pls.' Appendix A" refers to Appendix A to Plaintiff States' Response in Opposition to Google LLC's Motion to Dismiss Under Rule 12(b)(6), *State of Texas et al. v. Google LLC*, No. 4:20-cv-00957-SDJ (E.D. Tex. Feb. 21, 2014), ECF No. 260-1.

Appendix F: De-Duplication Methodology

364.   When counting both affected and unaffected transactions, removing duplicates is a simple exercise: the de-duplicated transaction count equals the count of transactions associated with Bernanke/Alchemist because: (i) among the programs at issue, Bernanke/Alchemist was the first to be introduced; (ii) the alleged deception concerning Bernanke/Alchemist ended in October 2021, so no states are time-barred barred from recovering penalties based on that alleged deception.

365.   However, when unaffected transactions are excluded, removing duplicates becomes a more complex exercise because information is unavailable on which specific transactions are impacted by each of the programs at issue. To address this data limitation, I assume that the likelihood that a particular program impacts a transaction is independent from the likelihood that other programs affect the same transaction, conditional on state, month, and demand source (Google Ads, DV360, or Authorized Buyers).

366.   Specifically, I proceed as follows. For each month (m), state (s), and demand source (d), I start from the count of de-duplicated transactions from row 6 of Table C1. These transactions represent the total number of transactions that could *potentially* be affected by a program; I refer to them as $Q(m, s, d)$. For each program, I estimate the number of affected transactions, as explained in Section IV.G, and then calculate the likelihood that a transaction is affected by the program as the number of affected transactions divided by $Q(m, s, d)$. I refer to these probabilities as $p(m, s, d|program)$.

367.   Under an assumption of independence, the likelihood that a transaction is not affected by any of the programs at issues is $\prod_{\substack{k \text{ is one of the} \\ \text{programs at issue}}} \left(1 - p(m, s, d|k)\right)$. This in turn implies that the probability that a transaction is affected by one or more of the programs at issue is $1 - \prod_{\substack{k \text{ is one of the} \\ \text{programs at issue}}} \left(1 - p(m, s, d|k)\right)$. The de-duplicated number of affected transactions is simply the product of $Q(m, s, d)$ (namely, the total number of transactions that could potentially be affected) and the probability that a transaction is affected by at least one program.

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Month	m
State	s
Demand Source	d
Total Count (Including Unaffected)	$Q(m, s, d)$
Likelihood of Being Affected by a Program:	
RPO	$p(m, s, d\|RPO)$
DRS v1	$p(m, s, d\|DRSv1)$
DRS v2	$p(m, s, d\|DRSv2)$
Second Price Bernanke	$p(m, s, d\|Second\ Price\ Bernanke)$
Alchemist (First Price Bernanke)	$p(m, s, d\|Alchemist)$
Equal Foot. (NBA & Bernanke)	$p(m, s, d\|Equal\ Footing)$
De-Duplicated Count	$Q(m, s, d) \times \left(1 - \prod_{\substack{k\ is\ one\ of\ the \\ programs\ at\ issue}} \left(1 - p(m, s, d\|k)\right) \right)$

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Appendix G: Settlement Payments and Fines Relied Upon by Mr. Andrien

Table G1
Settlement Payments and Fines Relied Upon by Mr. Andrien

Case Number	Jurisdiction	Type of Case	Reason for Google Payment	Date When Decision or Settlement was Imposed	Amount of Payment (USD)
[1]	EU	Privacy	Fine	3/7/2011	$140,330
[2]	EU	Privacy	Fine	4/22/2013	$189,185
[3]	EU	Privacy	Fine	12/19/2013	$1,230,086
[4]	EU	Privacy	Fine	1/8/2014	$203,789
[5]	EU	Privacy	Fine	4/3/2014	$1,370,502
[6]	EU	Privacy	Fine	3/24/2016	$111,720
[7]	Russia	Antitrust	Settlement	4/17/2017	$7,828,669
[8]	EU	Antitrust	Fine	6/27/2017	$2,740,384,711
[9]	India	Antitrust	Fine	2/8/2018	$21,112,765
[10]	EU	Antitrust	Fine	9/14/2022	$4,120,000,000
[11]	Turkey	Antitrust	Fine	9/20/2018	$14,811,297
[12]	EU	Privacy	Fine	1/21/2019	$56,852,237
[13]	EU	Antitrust	Fine	3/20/2019	$1,691,353,620
[14]	Turkey	Antitrust	Fine	2/16/2020	$16,242,299
[15]	EU	Privacy	Fine	7/14/2020	$684,365
[16]	Turkey	Antitrust	Fine	11/13/2020	$25,675,842
[17]	EU	Privacy	Fine	12/7/2020	$121,383,026
[18]	Turkey	Antitrust	Fine	4/14/2021	$36,582,734
[19]	EU	Antitrust	Fine	5/13/2021	$123,069,664
[20]	EU	Antitrust	Settlement	6/7/2021	$268,373,342
[21]	EU	Antitrust	Fine	7/13/2021	$590,576,417
[22]	South Korea	Antitrust	Fine	9/14/2021	$176,640,000
[23]	EU	Privacy	Fine	11/26/2021	$11,200,000
[24]	EU	Privacy	Fine	1/6/2022	$169,590,563
[25]	EU	Privacy	Fine	5/18/2022	$10,499,241
[26]	Australia	Privacy	Fine	8/12/2022	$42,638,374
[27]	South Korea	Privacy	Fine	9/14/2022	$49,722,941
[28]	India	Antitrust	Fine	10/20/2022	$161,855,268
[29]	India	Antitrust	Fine	10/25/2022	$113,000,000
[30]	US	Improper Advertising	Settlement	8/24/2011	$500,000,000
[31]	US	Failure to respond to Letter of Inquiry	Fine	4/16/2012	$25,000
[32]	US	Privacy	Settlement	8/9/2012	$22,500,000
[33]	US	Privacy	Settlement	3/12/2013	$7,000,000
[34]	US	Privacy	Settlement	11/18/2013	$17,000,000
[35]	US	Campaign Finance	Settlement	12/18/2018	$217,000
[36]	US	Privacy	Settlement	9/4/2019	$170,000,000
[37]	US	Campaign Finance	Settlement	6/17/2021	$423,659
[38]	US	Privacy	Settlement	12/13/2021	$3,850,000
[39]	US	Litigation Misconduct	Sanction	7/15/2022	$971,715
[40]	US	Privacy	Settlement	10/4/2022	$85,000,000
[41]	US	Privacy	Settlement	11/14/2022	$391,500,000
[42]	US	Privacy	Settlement	11/28/2022	$9,400,000
[43]	US	Privacy	Settlement	12/29/2022	$9,500,000
[44]	US	Privacy	Settlement	12/30/2022	$20,000,000
[45]	US	Litigation Misconduct	Sanction	3/20/2023	$79,000
[46]	US	Litigation Misconduct	Sanction	3/28/2023	N/A
[47]	US	Privacy	Settlement	9/15/2023	$155,000,000
[48]	US	Privacy	Settlement	4/1/2024	$5,000,000,000

Notes: The matters listed in lines [1] - [46] of this table are cited in Oracle's draft complaint to the Federal Trade Commission. See Oracle Corporation, "Draft Complaint In the Matter of Alphabet, Inc.," May 8, 2023, at Exhibit B ("Oracle Complaint"). The matters listed in lines [47] and [48] of this table are described in Mr. Andrien's Report but are not listed in Oracle Complaint. See Andrien Report at ¶ 125 and footnotes 310-311. Where possible, I use the same third-party sources as cited in Exhibit B to the Oracle Complaint, but there are three discrepancies with the figures provided in the Oracle Complaint. First, in Table G1, row 10, both I and the Oracle Complaint (at B-2) cite to Reid, Jenni, "Google Loses Appeal Over EU Antitrust Ruling, But Fine Cut to $4.12 Billion," *CNBC*, September 14,

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2022, available at https://www.cnbc.com/2022/09/14/eu-court-backs-antitrust-ruling-against-google-but-reduces-fine.html (last accessed July 25, 2024). However, while the Oracle Complaint lists the "Date Imposed" as July 18, 2018, the source notes that the fine was finalized after an appeal on September 14, 2022. I use the latter date as it is the "Date When Decision or Settlement was Imposed" and use the associated USD conversion, as reflected in the CNBC article and original Oracle Complaint source. By not updating the date, the Oracle Complaint appears to use an outdated currency conversion rate to calculate the US Dollar amount. I have corrected this in my calculations, as substantiated by the CNBC article. This results in a $682,668,982 reduction in the associated fine amount. Second, rather than relying on the Oracle Complaint currency conversions, I chose to rely on the US Dollar value as represented in the relevant third-party sources. This results in a net difference, for rows 1-46, of $683,944,608 between my fine estimates and those provided in Exhibit B of the Oracle Complaint. Specifically, for the 2021 South Korean Android case in row 22, my source shows the fine to be $751,438 lower than the Oracle Complaint's figure. See Table G1, row 22 and source [22]; Oracle Complaint at B-3. For the 2022 India Google Play case in row 29, my source shows the fine to be $524,188 lower than the Oracle Complaint's figure. See Table G1, row 29 and source [29]; Oracle Complaint at B-4.

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below, and does not admit to any violation of or liability arising from any federal, state, or local laws in stipulating to the entry of this Assurance.").

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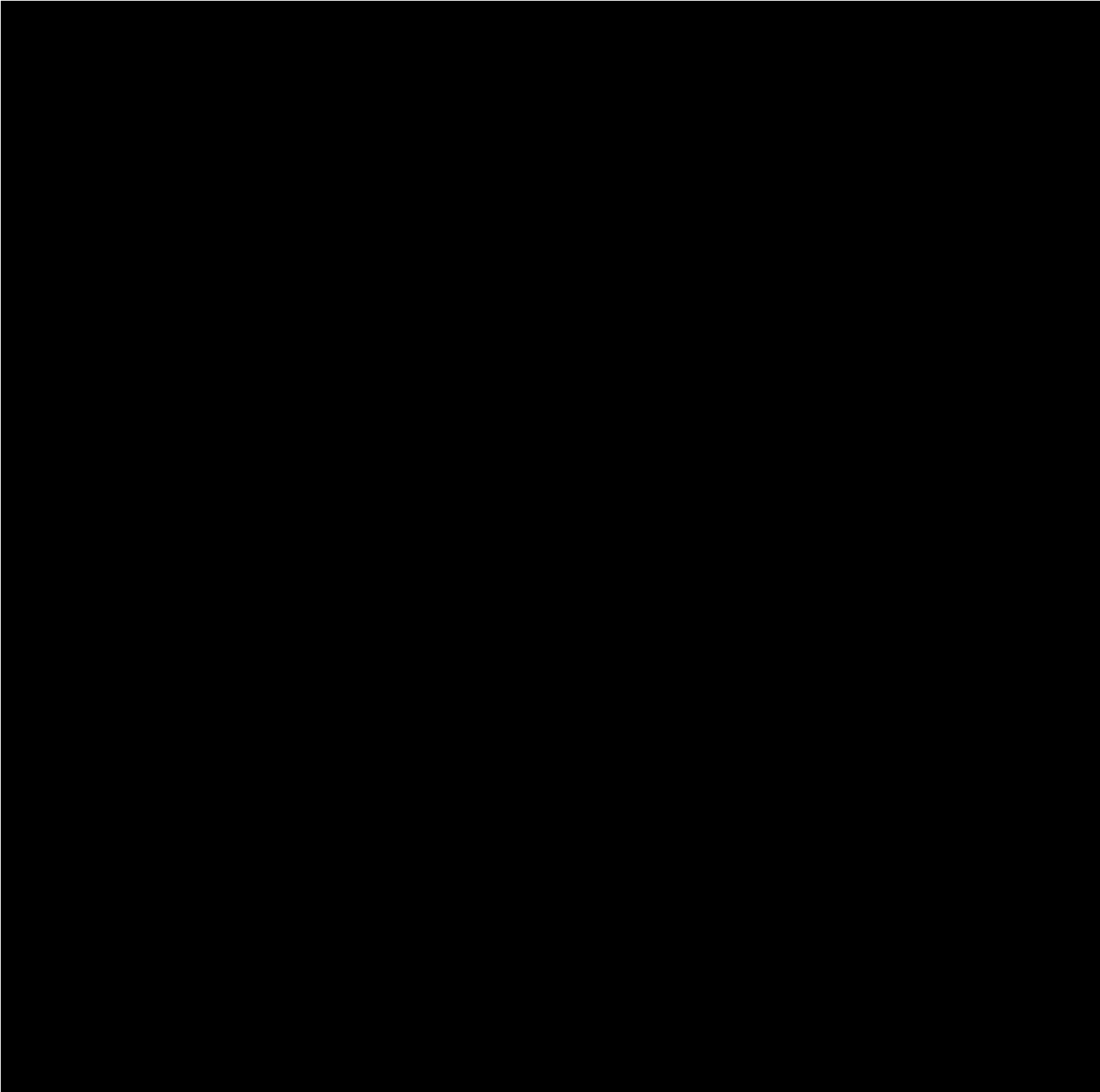
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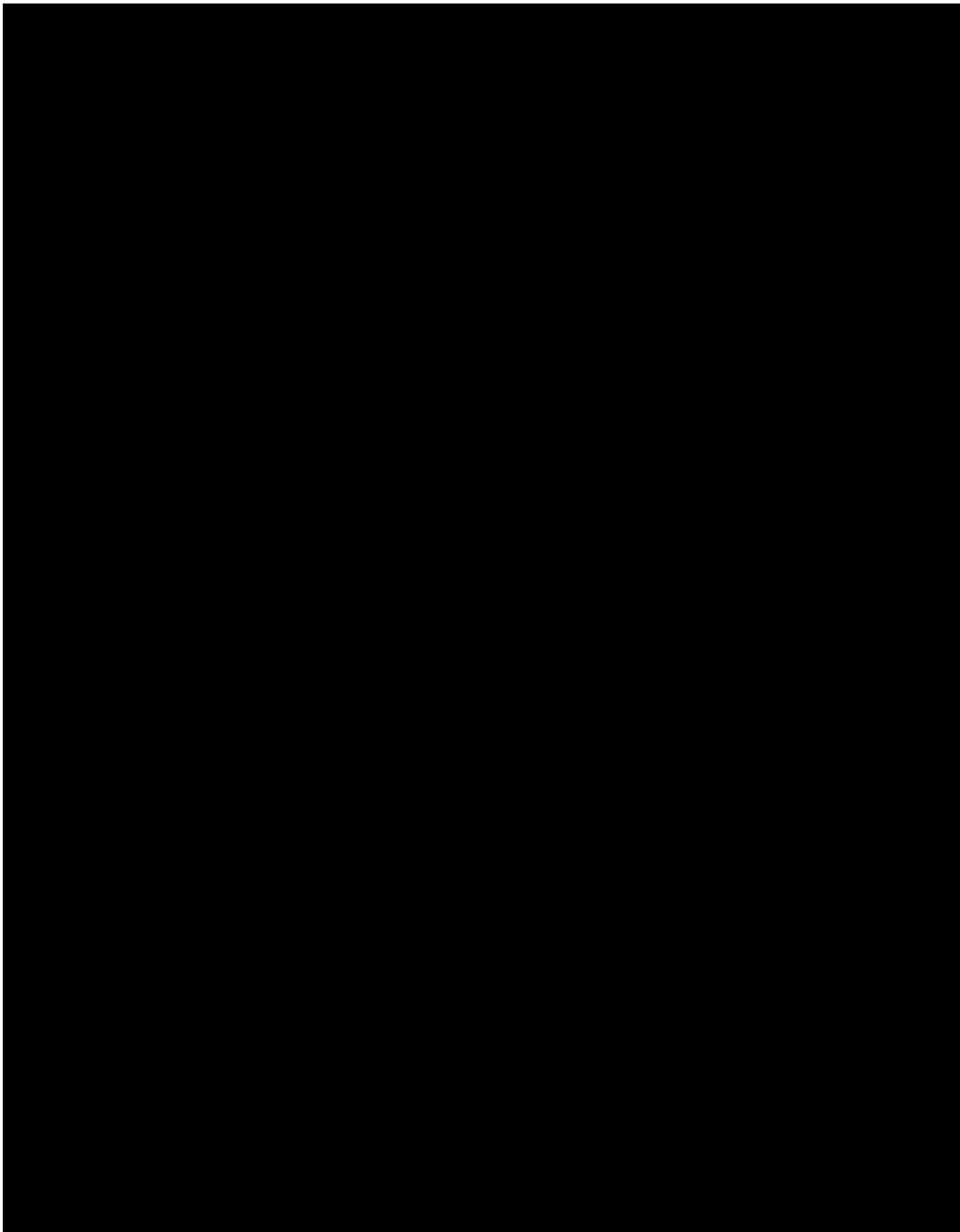
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Appendix H: **Overview of Google Datasets**

368.   In this Appendix, I list the Bates numbers associated with the Google datasets that I analyze and describe how various variables were constructed. Note that text enclosed in angular brackets ("<text>") indicates original variable names as they appear in the raw data production.
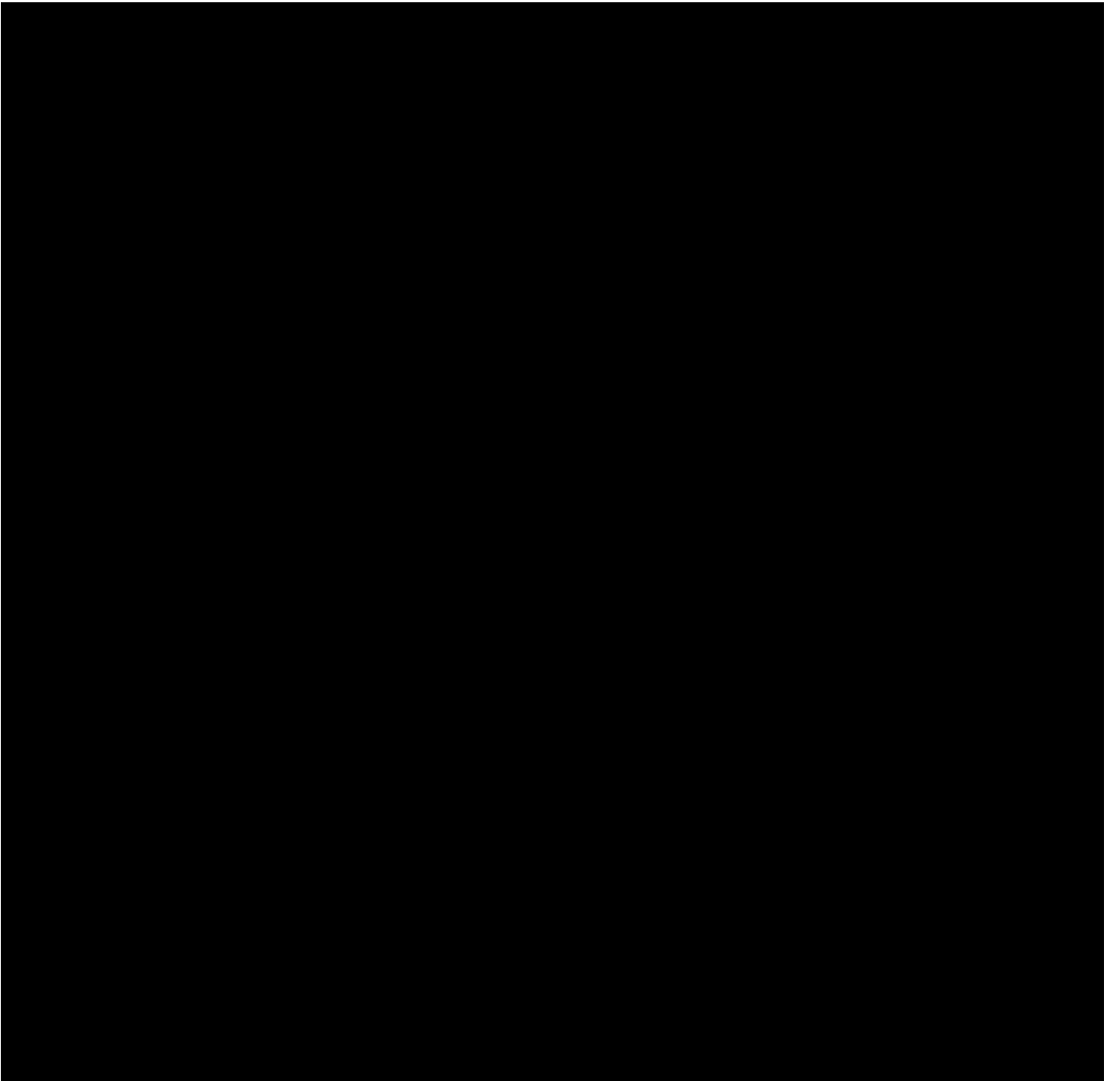
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Appendix I: Methodology to Account for Advertisers and Publishers That Are Unidentified in the Data

369.   *Advertisers*. ███████████████████████████████████████
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██████████████████████████

370.   To account for these advertisers, I proceed as follows. I calculate the number of advertisers in the Google Ads and DV360 data, which provide a more complete picture of the advertiser identity. Let (i) N(GA, GA) be the number of Google Ads advertisers in the Google Ads data, (ii) N(GA, AdX) be the number of Google Ads advertisers in the AdX data, (iii) N(DV, DV) be the number of DV360 advertisers in the DV360 data; and (iv) N(DV, AdX) be the number of DV360 advertisers in the AdX data. I estimate an adjustment factor equal to R = (N(GA, GA) + N(DV, DV)) / (N(GA, AdX) + N(DV, AdX)). I then multiply the count of advertisers in the AdX data ███████████████ ██████████ by R.

371.   *Publishers*. ███████████████████████████████████████
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███
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372.   I calculate the percentage of impressions accounted for by publishers that are identified in the data; then divide the count of these publishers by this percentage. In other words, I "inflate" the count of publishers that Google does identify to account for the publishers that are not identified in the data.

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[580] GOOG-AT-MDL-001776806. Calculations available in workpaper "DTPA Transaction Count Tables.xlsx", for both shares of unidentified advertisers and publishers.